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The Electric Furnace for the Foundry

Considerations in Choosing the Proper Unit for Making
Steel Castings—Too Large Sizes Often Selected
—Place of Acid and Basic Operations

BY CHARLES WELLMAN FRANCIS

THE advent of the electric furnace as a real commercial factor in the iron and steel industry for the past six to seven years has revolutionized the foundry business far beyond expectations. It no longer remains to be proved that castings made by the electric furnace process are of a finer quality and at the same time cheaper than those made by any other method of melting. Metallurgists and electric furnace engineers throughout the country agree that there would be more of these units in operation were it not for the ever present prejudice against their initial cost, and prospective users of electric furnaces must suppress their reluctance in order to give this process a fair trial.

Probably the most outstanding question which confronts the prospective purchaser of an electric furnace is that of the proper size or tonnage capacity to be chosen. To many this may not seem a very difficult problem to settle, but we have but to look around us to see a number of failures due to the inability to cope with this phase of the situation successfully. The writer can cite several instances where installations have proved "white elephants" because of a lack of sufficient floor space to handle the output of the unit installed.

The 3-ton furnace has universally become the most popular size furnace for foundry use in making the average run of jobbing steel castings. Foundrymen have in some instances feared they would not have sufficient melting capacity and have installed one unit of 6 tons capacity, and have not realized their mistake until depressions in business appeared. Then they begin to realize that tapping a 3 or 4-ton heat from a 6-ton furnace once or twice a day is not good operating economy.

Another reason is that even though business be plentiful, most foundry superintendents try to clear the floor of work by the end of the day turn. Not having enough molds to take a full heat, they are obliged to undercharge the furnace, which requires

longer proportionate time per heat, excess of power and electrode consumption, all tending generally to increase greatly the melting costs. Still further, should melting troubles be encountered, as is often the case, caused by broken electrodes, burning out of roofs, etc., a number of laborers must be kept after the end of the day turn to handle the heat. Often time and half time must be paid these men, which fact also adds considerably to the cost and is often sufficient to counterbalance all profits, to say nothing of causing labor dissatisfaction.

A large proportion of these difficulties can be eliminated by installing two units of 3 tons each, instead of one 6-ton unit, as it is an easy matter to time two electric furnace heats to be tapped at the same time, should the demand arise for a larger amount of metal than can be tapped from one furnace.

Another angle of this question to be considered in purchasing electric furnace equipment is the fact that the most reliable furnace builders have designed their furnaces so that they can be charged 25 to 50 per cent above capacity and can be operated continuously without overtaxing the installation in the least. The large electrical equipment companies have met their part of this situation by building furnace transformers to withstand a 40 deg. rise in temperature and carry 50 per cent or more overload for a period of

2 hr. continuous operation without endangering a transformer blowout.

When the molding foreman can so adjust his work as to keep a little ahead of the melting foreman, thus enabling the furnaces to operate under conditions which the writer has just outlined, then and there only can the foundry production closely approach 100 per cent and give minimum operating costs. The writer is well acquainted with one company in the Middle West which over a period of one month produced 13 to 14 6-ton heats of mild steel for castings from a rated 3-ton capacity furnace. Needless to say this company's operating

THE author of the accompanying article, on the basis of some years experience in electric furnace work, both as superintendent and metallurgist, proposes to discuss in a number of articles the practical phases of the use of the electric furnace in the foundry. With the present contribution as an introduction the articles are to cover:

Construction Features for Operating Economy.

Acid Furnace Practice.

Basic Furnace Practice.

Comparison of Costs of Acid and Basic Operations.

Electric Furnace Labor Problems.

costs were at a minimum for this period.

Electric power facilities must be looked into thoroughly when an electric furnace installation is contemplated. The author cannot emphasize this side of the problem too strongly. It has been only a few years since that central station engineers and foundrymen were at swords points continually, due largely, the writer feels, to the ignorance of each to the other's problems. This situation is gradually being relieved, each doing all in his power to meet the other half way. The power engineer's greatest problem seemed to be the unbalancing effect that electric furnace "surges" tend to produce on the power line, causing considerable complaint from other power consumers on the same line. These "surges" which occur on all furnaces are made easier by the proper reactance in the circuit, a problem which should be thoroughly investigated at the start.

The question of the use of acid or basic operation is a vital one, and the choice of one or the other is dependent on a large number of factors. If the furnace is to be used for the manufacture of alloy steel castings, then it is almost imperative to use basic refractories, for on a basic bottom only can rigid alloy specifications be met and controlled without considerable loss of alloys.

The output of the majority of electric steel foundries is castings made from mild steel for the ordinary run of machine and jobbing work. This specification usually averages 0.25 per cent carbon; 0.75 manganese, 0.30 silicon. It is the author's

opinion that for this class of work the acid lined furnace is the most practical from a production standpoint as well as the standpoint of operating economy, due largely to the fact that little or no refining is necessary in this case. It is best to use a good grade of scrap, such as heavy axle turnings, boiler plate punchings, light plate scrap, light forging stock or light forge flashings. In other words, use any good basic shoveling scrap, for there is no economy in charging the furnace with cheap scrap high in phosphorus and sulphur, and utilizing an excess of electric power and electrodes and a number of basic slags to reduce the phosphorus and sulphur and reach the desired specifications.

The acid furnace is particularly adapted to light "snap" work in the foundry where clean and hot metal is essential. These heats can be poured into a big ladle and "shanked" off, as is done with cupola metal in the iron foundry. With the proper care in handling, the loss in floor scrap and "spills" is practically negligible in this case.

Some of the points in the foregoing paragraphs may appear to be somewhat off the subject, and while they are of a more practical operating nature, they best exemplify some of the reasons for the choice of acid or basic practice in the foundry. Other minor features of some importance might be added to what has been said above, which will have some bearing on the choice of an electric furnace, but it will be found that they are all more or less interwoven each with the other, and with what have been already mentioned.

TOOL MERGER COMPLETED

Consolidated Machine Tool Corporation Elects Officers and Takes Over Five Plants

The organization of the Consolidated Machine Tool Corporation, 17 East Forty-second Street, New York, has been completed with the formal transfer of plants to the new company and the election of officers.

W. H. Marshall, formerly president of the American Locomotive Co., becomes chairman of the board; C. K. Lassiter, formerly vice-president in charge of manufacturing of the American Locomotive Co., is president, and there are five vice-presidents, each of whom will have charge of a specific branch of the company's activities as follows: James J. Dale of the Dale Machinery Co., machine-tool dealer, which has been absorbed by the Consolidated Machine Tool Corporation, will be located at the company's executive offices in New York; A. H. Ingle of the Betts Machine Co., Rochester, N. Y., will have the management of the Betts plant; Harry W. Champion, formerly president of the Newton Machine Tool Works, Philadelphia, will continue in charge of that plant; H. W. Breckenridge, formerly president of the Colburn Machine Tool Co., Cleveland, will remain at the Colburn plant, and H. J. Bailey, who has been president of the Hilles & Jones Co., Wilmington, Del., will be manager there. F. D. Paine, who will be in charge of the plant of the Modern Tool Co., Erie, Pa., is a member of the board of directors, but not a vice-president.

All of the above-named officers are members of the board of directors, which includes also B. J. Baker of B. J. Baker & Co., bankers, Boston; Lawrence Chamberlain of Lawrence Chamberlain & Co., bankers, New York, and T. Allen Hilles, Wilmington, Del. R. R. Lassiter is secretary of the company.

The capital stock consists of \$10,000,000 of 7 per cent preferred and 200,000 shares of common of no par value. There is also a bond issue of \$3,600,000. The appraised value of the plants entering the new company is given as \$7,455,000 and the average annual net earnings of the five companies for the period Jan. 1, 1916, to April 30, 1922, is given as \$1,023,014.

For the present, at least, none of the agency arrangements of the five machine-tool manufacturing companies which have entered the new organization will be disturbed. The Dale Machinery Co., which has handled both in New York and Chicago lines of tools made by companies which are not a part of the new company, has turned over these agencies to the Consolidated Machine Tool Corporation, which will continue the work as a dealer conducted by the Dale organization. An office will be maintained in Philadelphia, in addition to those now in New York and Chicago, while plans for offices in other large cities are in abeyance.

Additional floor space is being taken by the corporation on the third floor of the National City Building, 17 East Forty-second Street, New York, which will provide about 5000 sq. ft. of floor including the offices which have been occupied for the past year by the Dale Machinery Co.

Speculation as to Location of North American Steel Offices

Now that the Department of Justice has officially approved the proposed merger of the Inland Steel Co., the Republic Iron & Steel Co., and the Midvale Steel & Ordnance Co., as well as the proposed Bethlehem-Lackawanna combination, there is considerable speculation as to where the general offices of the former are to be located. Although it has no plants in Pittsburgh, there is a possibility of that city being selected on account of its central location in relation to the several plants, located at Coatesville and Johnstown, Pa., Youngstown, Ohio, and in the Chicago district, these several points being within easy riding distance of Pittsburgh. The general offices of the constituent companies now are in Chicago, Youngstown, Ohio, and Philadelphia, but executive offices of both the Midvale and Republic companies are in New York. Youngstown is almost as central as Pittsburgh, but is hardly likely to be selected and Chicago in spite of the fact that it contains the Inland Steel Co., and some of the plants of the Republic Iron & Steel Co., it is believed has small chance of being chosen. It is probable that New York will get the offices, with Pittsburgh a second choice.

IMPROVES MILLING MACHINE

Rockford Company Develops New Feed Transmission—Attachments Added—Other Features

A LITTLE over a year ago the Rockford Milling Machine Co., Rockford, Ill., put on the market a No. 3 high-power, single-pulley drive milling machine, embodying several new features, notable among which was a method of transmitting the feed drive to the knee, saddle and table, which eliminated the use of a telescopic feed shaft and universal joints. This machine was described in THE IRON AGE of April 21, 1921, page 1039. In that design the feed-reverse and quick-

one end, so that the friction can be set to break for a predetermined pressure.

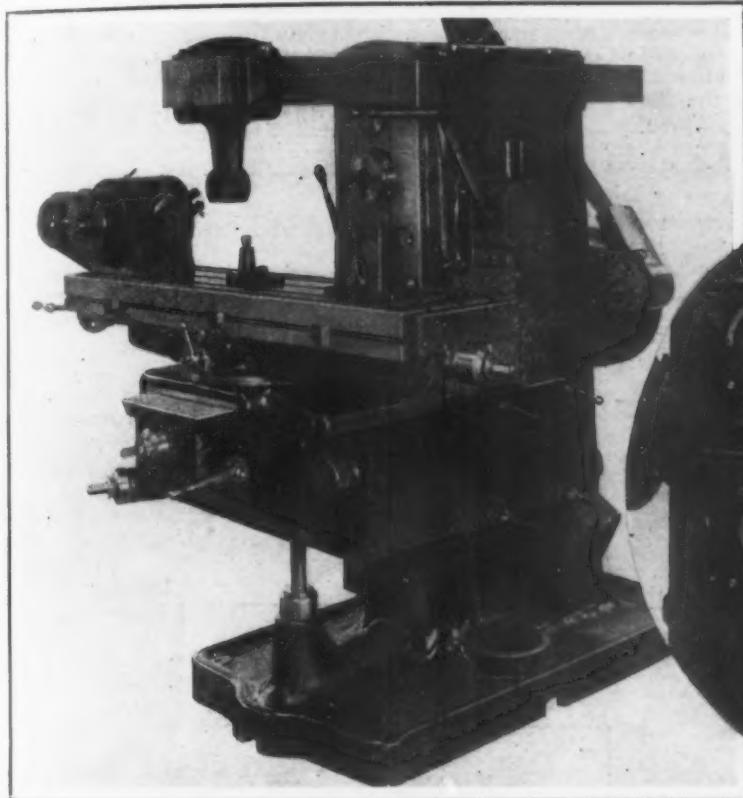
Another change is in the feed-control lever, which determines whether the transverse or vertical feed is being engaged. This is located, as in the older design, on the left-hand side of the knee, but has been provided with a dial marked with the two positions of engagement, i. e., "transverse" and "vertical," as well as a third position, "neutral," in which neither feed is engaged.

The spindle of the new machine has phosphor-bronze taper bearings and is provided with a new style positive lock nut at the ends.

New Attachments Provided

Several new attachments have been provided for the machine, among which is the universal milling and

The Feed Transmission Is Inclosed in the Knee Casting Which Projects from the Knee and Bears on the Wide Face Shown. The feed control lever, located on left-hand side of the knee, is marked for various positions of engagement.



return gears were located in a box which projected from the right-hand side of the column; a drive shaft extended from the bottom of the box to a second gear box located at the base of the machine; from the latter box a splined shaft connected through a pair of bevel gears with the drive shafts in the knee.

The company has now gone a step further and has eliminated the employment of drive shafts in conveying power to the knee. The transmission is all inclosed in the knee casting which projects on the right hand side of the column, bearing on a wide face, which also had been provided in the previous machine. A long gear in vertical position is located in the part of transmission housing which fits over the face on the side of the column, and throughout the range of the movement of the knee is always in mesh with the feed-reverse and quick-return gears, which in the new design are located inside of the column directly behind the plane of the face. The long gear connects through a pair of bevel gears with a second long gear in horizontal position on the side of the knee, which meshes with the gears operating the knee, saddle and table. Thus it is to be noted that the feed drive throughout is through gears always in mesh and that there are no connecting shafts.

A friction adjustment has been provided on the horizontal long gear and serves to release the feed drive in case of accident or carelessness. This is accomplished through a friction clutch with double points of contact through fiber washers set at each end of the gear. Graduations have been provided on a collar at

drilling attachment described in THE IRON AGE of July 6, page 29.

A new dividing head in which two index plates take care of the indexing formerly done by three is another added attachment. One turn of the index crank is equivalent to a turn of 9 deg. on the spindle. Two arms have been provided on the index plate for quick setting; and for easier handling, these arms are extended beyond the periphery of the plate. The index crank is equipped with a plunger which can be withdrawn and kept out of engagement with the holes in the plate by a slight twist of the knob. The index plates are graduated to read in minutes on spindle. The worm has unusually sturdy support and bearings, and is adjustable for wear. A positive stop has been provided for throwing the worm out of mesh.

The machine is also equipped with a power-driven rotary table attachment. Feed is obtained through a telescopic shaft which is attached to the horizontal long gear in the knee, and is transmitted through bevel gears and shafts which clear the saddle and horizontal table, to a large worm wheel with ball thrust bearings under the rotary table. The worm drive of the table has the same gear ratio as that of the dividing head, so that an index plate can be transferred to the table and indexing can be done as readily as on the dividing head. The dial of the table is graduated down to two minutes. Thus the table can be accurately swung to any desired angle in the horizontal plane.

Another attachment has been provided for slotting. This fits over the end of the rectangular overarm

which gives it rigid support and is driven from the spindle by a crank.

Outstanding among the attachments is a standard vertical head which is bolted to the top of the column after the overarm has been removed, and which has unusual rigidity. It is emphasized that a horizontal machine equipped with this attachment differs in no respect from the standard vertical machine except that the horizontal spindle is omitted. A further advantage is that it can be set over on the column one set of bolts to obtain a greater throat distance, in the normal position the overhang from the column being 15 in.; and

Instrument for Testing Gear Teeth

The Pratt & Whitney Co., Hartford, has placed on the market a set of instruments for testing gear teeth, known as Odontometers. These instruments, one of which is illustrated herewith, are of simple design and self-contained. They are used for testing the accuracy or uniformity of the gear tooth profiles and spacings of the teeth in production work.

The instrument illustrated on the gear has a range of from 3 to 10 diametral pitch, may be used to check gears of any pressure angle, and can be applied to a gear while it is in place in the machine. In effect it is composed of a section of a straight-sided rack with two parallel effective faces, one fixed and the other



Odontometer Provided with a Stand and Testing a Pinion-Shaped Cutter Is Shown at the Left. The cutter is placed on a surface plate and rolled by the instrument

Odontometer Shown at the Right May Be Applied to Gear While in Place in Machine

movable. A third face, set at an angle to the two working faces, is used to hold the fixed working face in contact with the flank of the gear tooth. The fixed registering surface is at A, the movable indicating surface at B. The third surface, C, holds surface A in contact with the involute surface of the gear tooth. The surfaces B and C are adjustable so that gears of various pitches can be tested with the same instrument.

The indicating surface, B, is mounted on two thin flat springs, D, which act as pivots free from backlash. The dial indicator, E, is actuated by the lever, F, which has a ratio of 5 to 1, each division on the dial representing a movement of 0.0002 in. of the indicating surface, B.

In general the instrument is used as a comparator to test the uniformity of interchangeable and mating gears. If actual measurements are required, the distance between the two parallel working faces of the

when set over, 20% in. The older type of vertical attachment which is driven from the spindle of the horizontal machine and the head of which is fastened over the end of the over arm, is also available.

The new Rockford machine is constructed in two sizes, No. 3 heavy and No. 4 standard, the former having a 15 by 55 in. table, with a 34 in. feed, and the latter a 15 by 68 in. table, with a 42 in. feed. The unusually long overarm, 68 in. from end to end, has been retained and the specifications are for the most part the same as given for the previous type of machine.

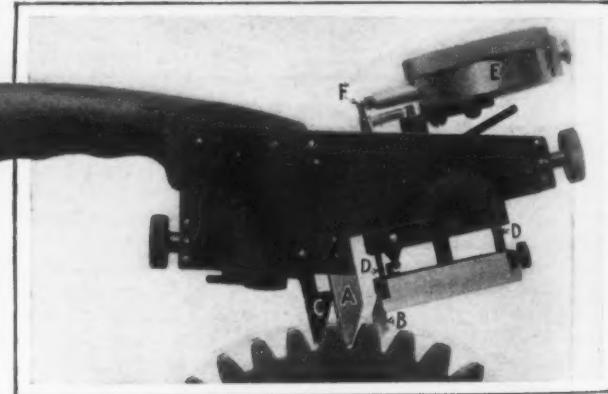
instrument can be measured. Stands are provided to hold the two smaller sizes of Odontometers when gears or pinion-shaped cutters are being tested. In this case the gear is placed on a surface plate and rolled by the instrument, as shown in the separate illustration. The actual cutting edge of cutters is tested, so that the errors, of whatever nature, are detected.

The gages are made to check gears in the following range of sizes: $\frac{3}{4}$ to 4 pitch, 3 to 10 pitch and 10 to 24 pitch.

Drill with Mechanical Reversing Device

A reversible electric drill, which reverses mechanically and is intended to eliminate electrical troubles occurring in drills of this type, has been developed by the Independent Pneumatic Tool Co., Chicago.

The reverse is operated through a mechanical device located in the gear case. The motor runs always in the same direction and the shock resulting from reversing the current under load and speed is eliminated. The reversing gear is provided with a locking device which, it is explained, can be shifted instantly to permit a locked constant forward motion for general drilling, reaming, stud driving, nut tightening and tube rolling, and a locked constant reverse motion for backing off nuts and other fastenings. The third shift gives the neutral position which permits the spindle to slip into forward motion when the machine is pressed against the work and to slip into reverse motion as the machine is withdrawn. This is an automatic action



that follows the operator's movements, making the tool especially adaptable for use in wood boring, tapping, flue rolling and similar work.

The patent applied for covers the device on both electric and pneumatic tools.

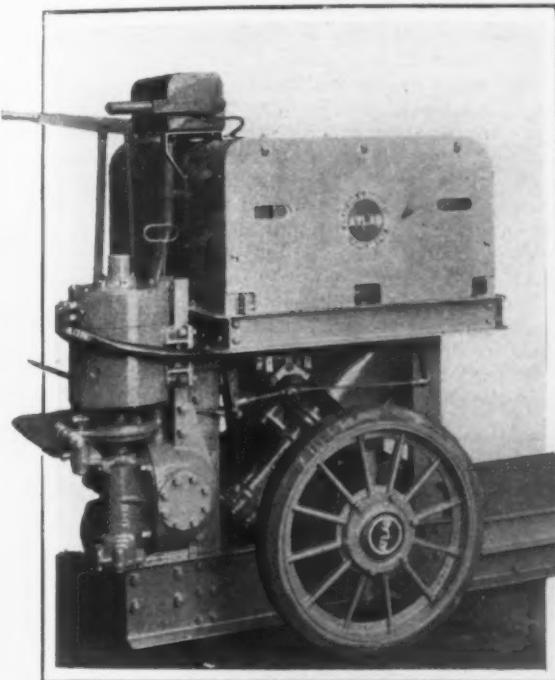
The production of natural gas in the United States in 1920 amounted to 860,540,000 cu. ft., according to the United States Geological Survey. Of the total, 28.4 per cent was produced in West Virginia, 19.3 per cent in Oklahoma and 14.9 per cent in Pennsylvania. The total consumption was 798,210,000 cu. ft., and of this total 20.2 per cent was used in Pennsylvania, 17.1 per cent in Ohio, 15.9 in Oklahoma and 12.6 per cent in West Virginia. The average price paid in Pennsylvania was 32.1c. per 1000 cu. ft., and in Ohio 36.8c. The average price covering the entire consumption was 24.8c.

Platform Truck for Foundry Use

An electric platform storage-battery truck of 5-ton capacity, shown in the illustration, and intended for use in foundries in handling large core racks in and out of core ovens, has been added to the line of the Atlas Car & Mfg. Co., Cleveland.

The load platform is 7 ft. 2½ in. long, 30 in. wide, and in its lowest position is 11½ in. above the floor. Its lift is 4 in. The over all length is 11 ft. 8 in. and the width, 4 ft. The inside turning radius is 5 ft. 9 in. and the outside turning radius is 12 ft. and with a core rack 5 ft. 1 in. wide and 7 ft. long, the car can be operated through interesting aisles 8 ft. wide. The truck without a load has a speed of 700 ft per min., or 8 mi. per hr., the loaded speed depending on the condition of the floor.

The driving wheels have solid metal base rubber tires 27½ in. in diameter and 4½ in. wide. The trailing or load carrying wheels are of steel, crown faced, 10½ in. in diameter by ¾ in. face and 11½ in. tread and revolve on a double row of ball bearings. A ball thrust bearing is also provided for ease in steering.



Steering is applied to all four wheels. The driving wheels have the Atlas type cover over the universal joints and the driving knuckle pivots are provided with inclosed ball-thrust bearings. The driving shafts and universal joints are removable from the outside and held in place by bolted clutch plates.

The driving reduction is through an inclosed worm and wheel, the motor being flexibly coupled to the worm. A contacting type of shoe brake interlocks with the foot-pedal lever and controller safety switch in such manner that the brake is applied when pressure is completely relieved from the foot brake. The controller handle may be left in speed position but with the use of the interlocking arrangement the brake cannot be released until this handle has been brought to neutral, thus insuring that the truck will always be started on first speed. There are three speeds in either direction. Either Edison or Lead batteries may be used, the latter being the standard.

The elevating mechanism consists of a motor flexibly coupled to a double-worm reduction. A longitudinal shaft keyed to the worm wheel of the last reduction carries two miter gears which mesh with miter gears on the ends of four crank shafts located in a cross-wise position, two being on either side. The outer ends of the crank shafts form crank pins and are provided with hardened steel flanged rollers which bear against hard steel wearing plates on the under side of the platform. In operation these crank shafts are revolved simultaneously a half revolution, which

causes the elevating of the load platform. In lowering the load this motion is reversed.

The control of the platform is simple, a handle being pushed upward to raise the platform and pushed down to lower it. It is stated that a 5-ton load is elevated 4 in. in 10 sec. The limit switch is operated automatically by the load platform and is thrown out of circuit in the up and down positions and at the same time a brake is applied to hold the load in place.

Desulphurizing of Coke

A study of the desulphurization of coke was begun July 1 at the experiment station of the United States Bureau of Mines at Pittsburgh. This is a practical follow-up of the theoretical study of the oxidation of iron sulphate in the coke and the subsequent removal of the free sulphur formed by this oxidation. Literature on this subject is being reviewed. Many patents were taken out in the years 1850 to 1870 and few since. Roasting and steaming were favorite methods. In this connection, methods for converting sulphur in coke into the FeS form are being sought. A process based on such method would hold back sulphur that might ordinarily be evolved, then this sulphur could later be removed by oxidation together with much additional sulphur. It seems that Fe_2O_3 mixed with coal being coked decreases the sulphur in solid solution. The work is being undertaken by Dr. A. R. Powell, physical organic chemist, and John H. Thompson, research fellow of the Carnegie Institute of Technology.

Imperfect Management

"The most difficult part to get right in a producing organization is management," states President F. C. Biggert, Jr., of the United Engineering & Foundry Co.,

Pittsburgh, in a statement to employees of the company's plants at Pittsburgh, Youngstown, Canton and Vandergrift, Pa. "It is never 100 per cent right and seldom 70 per cent. On an average, it is probably not 50 per cent right, and yet the advantages of large

scale manufacture are so great—I mean that the increased production of goods by large manufacturing is so great—that with only this poor average management it is possible to give real service.

"This part of our manufacturing is poor because we cannot get better men for the job. If management, in which I include all those in authority, can be improved, the cost of all products can be greatly decreased. Where an individual company has exceptionally good management, the result is increased profits to that company, so that in a sense the community is not immediately benefited, but one company cannot long maintain this condition. It soon spreads to competing companies and the general price is lowered.

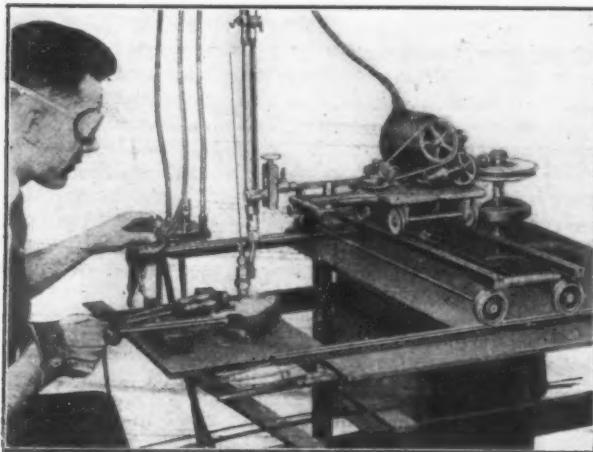
"We have better management to-day than formerly, the average is gradually improving and those companies which advance most rapidly will make the most profits and will, in the end, benefit every person."

Further expansion has been decided on at the Cumberland, Md., plant of the N. & G. Taylor Co., Philadelphia. A larger power house is to be built with improved type of boilers, automatic stokers, coal handling machinery and the like. Additional capacity has been added to the tin house to meet the demand for roofing plate, the company being conspicuously a maker of tin and terne plate. All the open-hearth furnaces of the plant are reported in operation and the bar mill has been running day and night turns.

Automatic Welding Machine

An automatic welding machine known as the "Gewe," the general construction of which may be noted from the accompanying illustration, has been brought out by the General Welding & Equipment Co., Boston.

The machine provides for heating up the line of welding on the work to the proper fusion point and heating up the material to be added, preparing it for fusion with the work and feeding in the added material continuously at a predetermined rate. It is also arranged to puddle together the molten particles of the work and the added material mechanically through the blowing action of the flame and the stirring action of the welding rod. Protecting the spot in fusion and the added material from the influence of surrounding air is by means of the cluster of flame inclosing the center of the weld and the welding rod. The work is said to be welded along the center of the seam and also to a cer-



Welding Machine in Use Joining a Drop-Forged Piece to a Split Tubing. The line of weld is an irregular curve which the machine, mounted on a double carriage system, follows by means of a pattern and a special drive

tain distance over both sides, the added material being spread over the same area.

The welding operation is performed not only with a straight progressing movement but also with an independent circular or elliptical movement of the torch, the combination of both movements being said to result in a spirally progressing, overspreading and overlapping weld. Separate adjustments are provided for the different procedures, which are operated mechanically and done at the proper moment with precision and without fatigue.

The illustration shows the machine in operation joining a drop forged steel piece of varying thickness to a split tubing of uniform thickness. The line of weld is an irregular curve, which the machine mounted on a double carriage, follows by means of a pattern and a special drive. The self-feeding torch, known as the No. 4, is oscillated in circles or in ellipses through an independent ex-center movement actuated by the sprocket shown. This movement is adjustable within wide limits. The finer feed regulations are obtained by an electric rheostat moved by the foot and permits slowing the machine down until heat conditions are right for steady movement. The welding wire passes through the center of the multiple-flame tip and feeds by gravity. It presses into the weld and when moved in spirals also forges itself in laterally. Thus, it is claimed, a combined fusion and forged weld is obtained.

A machine for heavy welding and having two torches is also available. On this machine one torch precedes the self-feeding torch and preheats the seam to very near the fusion point. Both torches are independently adjustable as to heat, height and inclination.

For extra long welds, such as long tanks, several sets of tandem torches can be used, each set welding one linear foot, a tank 8 ft. long being welded with seven sets, each starting a foot apart and the machine proper only progressing one foot. This, it is pointed out, would eliminate expansion, distortion and strain

caused by one-sided overheating, and would finish the work in one-eighth the time.

To Exhibit Electrical Heating Equipment

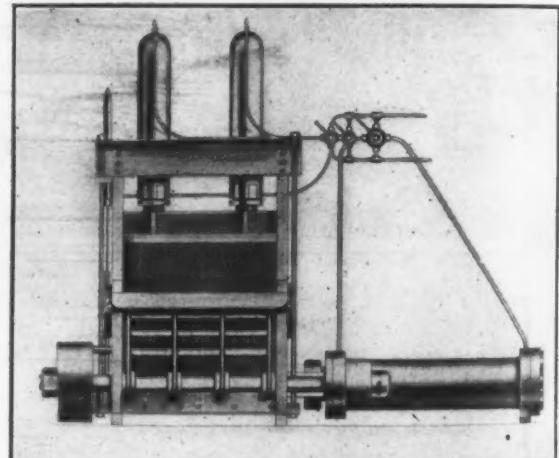
A portable semi-automatic arc welding outfit will be shown by General Electric Co. at the Chemical Exposition, Grand Central Palace, New York, during the week of Sept. 11. This outfit is mounted on a truck and will be in actual operation. The rest of the company's exhibit will consist of various devices for the industrial utilization of electric heat. Among them will be a semi-cylindrical heat treating furnace, a tool room muffle furnace and a soldering iron muffle furnace. In addition there will be an electric rivet heater, an electrically heated oil tempering bath, a self-regulating metal melting pot for melting solder, babbitt, or similar non-ferrous metals, and a display of individual heating units. The exhibit will be in charge of I. W. Shugg, of Schenectady.

Hydraulic Press for Baling Scrap

A bundling press employing the hydraulic principle has been developed by S. H. Garrett, 234 North Thirteenth Street, Philadelphia.

The machine, shown in the accompanying illustration, is known as the Tempus No. 4. All parts where stress occurs are either of structural or cast steel and wearing surfaces are lined with heavy boiler plate which can be readily replaced when worn. The cylinders are composition lined and provided with quick return movements. The pump may be driven either by a direct connected motor or by belt.

An outstanding feature is the large and conveniently low feeding opening, into which the scrap to be bundled may be shoved, forked or shoveled. This is obtained by dropping one side of the hopper to an angle of 55 deg., making a receptacle similar to a hay rack. When the charge is in, this side is closed by a hydraulic



Scrap Baling Press. A feature is the low feed opening

cylinder through a rack and toggle movement, forming the first operation in the squeezing process. At the same time the upper ram is moving down, making the second movement, after the completion of which the main pressure is applied. This forces the mass into a rectangular chamber, which is provided with a friction device that resists to within a fraction of the ultimate pressure.

The process is then repeated. When the second billet is formed, the first is pushed out, either to drop on the floor or to be carried by means of a chute to a storage pile or placed directly into a car. This chute can be made any length and made to run in any direction and by reducing the friction the entire force of the press may be made available for conveying the finished billets.

The Youngstown Boiler & Tank Co., Youngstown, Ohio, is enlarging its capacity and installing additional equipment.

Proposed Steel Mergers Are Not Illegal

Attorney General Daugherty Renders Exhaustive Opinion Concerning Union of Independent Steel Companies

BY L. W. MOFFETT

WASHINGTON, July 25.—In giving the anticipated clean bill to the independent iron and steel companies which are proposing to merge, Attorney General Harry M. Daugherty, in his report to the Senate last Friday, presented a really profound and interesting study not only of the negotiations of the corporations involved, but also of the steel industry itself. With this basis established, the Department of Justice, discussing the question from a legal point of view and the probable effect of the mergers, held that they would not be in violation either of the Sherman act, the Clayton act, or the Webb act. Going further, the Attorney General said that the motive which prompts the Bethlehem Steel Co. to acquire the Lackawanna Steel Co. is solely the desire to acquire greater efficiency and economy in production, etc. Dealing with the proposed merger of the Midvale Steel & Ordnance Co., the Republic Iron & Steel Co., and the Inland Steel Co., the opinion said that nothing in this merger violates the Sherman act and "that there is not the slightest ground to believe that restraint of trade or monopolistic control will result." It was held that there is but one underlying purpose in the combination; that is, to enable the new company to compete with the United States Steel Corporation, which, because of the widespread distribution of its various plants and their easy accessibility to the sources of raw materials, is "enabled to produce and sell its products much cheaper than other products." Emphasizing this point, the Attorney General said: "Instead, therefore, of being in restraint of trade, the new combination will be in furtherance of trade."

The report of the Department of Justice, made in response to a Senate resolution offered by Senator La Follette, was of the character expected. The Attorney General, in a statement issued on June 21, made it clear that the Department of Justice had exhausted its research regarding the mergers. Indicating that he found nothing illegal regarding them, the Attorney General announced publicly that he would be glad to "hear from any dependable person who has any legitimate argument to offer against the mergers." No such arguments, except those from several State attorneys general relating to possible bearing of the basing point controversy on the mergers, having been submitted, the report clearing the steel companies of any illegal action was submitted to the Senate. The Department of Justice obviously disregarded statements asking that it consider the Pittsburgh base case in connection with

the proposed mergers. This latter issue is still a matter that is before the Federal Trade Commission and is extraneous to the merger investigations of both the Department of Justice and the Federal Trade Commission and moreover has not been passed upon one way or the other, except for the issuing of a complaint.

The report of the Department of Justice was confined to the effect of the proposed mergers as they relate to the Sherman act, the Clayton act, and the Webb act. The investigation of the Federal Trade Commission regarding the mergers is under Section 5 of the Federal Trade act relating to unfair methods of competition and the Attorney General would not give any advice as to whether or not the mergers constitute a violation of this latter act.

The Federal Trade Commission, which has already issued a complaint against the Bethlehem and Lackawanna companies, held a conference last Wednesday with representatives of the Midvale Steel & Ordnance Co., the Republic Iron & Steel Co. and the Inland Steel Co., at the suggestion of the steel interests. They explained data that they have submitted regarding the proposed merger and submitted extensive schedules in connection with the questionnaire the commission has sent to steel companies throughout the country, designed to develop the effect of the proposed mergers on the steel trade. It is evident from a statement issued by At-

torney Thomas L. Chadbourne, representing the steel companies, that the commission is concerned as to whether this proposed merger has any connection with the merger of the Bethlehem and Lackawanna companies, and also as to whether the proposed merger had been discussed with the United States Steel Corporation. Mr. Chadbourne said distinctly that there was no relation between the proposed Midvale-Republic-Inland merger and that of the Bethlehem and Lackawanna companies and also that the approval or disapproval of the merger by the Steel Corporation "had never been asked or wanted."

Those present at the conference included Chairman John A. Topping, of the Republic Iron & Steel Co.; President A. C. Dinkey, of the Midvale Steel & Ordnance Co.; Chairman L. E. Block, of the Inland Steel Co., and Attorneys Chadbourne and William Wallace, Jr., New York; Levy Mayer, Chicago, and John J. Walsh, of Washington. Joseph P. Tumulty, former Secretary to Woodrow Wilson, also is associated as counsel for the steel companies.

When asked whether, as has been stated, this pro-

View of Bethlehem Purchase of Lackawanna:

Ingots production would be 9.7 per cent of the country's total.

"I am unable to find in the exhaustive investigation I have made any reasonable warrant for asserting that the public will suffer if this combination goes through. . . . The merger now under consideration will be neither an actual monopoly nor even an attempt to monopolize."

View of Midvale-Republic-Inland Merger:

"By owning plants that are widely scattered, where production can take place in accordance with the needs of the community lying closest to the plants; by manufacturing products at plants advantageously located to ore supplies; by reducing overhead expenses; and by eliminating unnecessary sales agencies, substantial economies can be effected. The combination being formed for this sole purpose, I am unable to see wherein it is tainted with illegality."

ject had the approval of the United States Steel Corporation, Mr. Chadbourne said, "Our proposed organization has never been discussed with any of the officials or directors of the United States Steel Corporation directly or indirectly; its approval or disapproval of our plans has never been asked or wanted."

Asked whether there was any intention to combine with the Bethlehem, Lackawanna, Youngstown, Brier Hill or Steel & Tube of America, Mr. Chadbourne replied, "I wish to declare solemnly that there are no negotiations pending with any of these concerns and no thought of any negotiations." In further discussing the proposed unification, Mr. Chadbourne said, "At the end of the war inflation—October, 1920—the steel producing capacity of the country was overbuilt from 30 to 40 per cent beyond what could reasonably be expected to be the consuming capacity for several years to come. During the succeeding year and a half, the steel companies produced between 30 and 40 per cent of their capacity and the independent companies lost many millions of dollars. The United States Steel Corporation did not suffer any loss during this period. On the contrary, it made a profit. This was due to its advantages in cheaper transportation on raw materials which go into the making of steel; a greater diversification of products so that it was always producing and selling the products most in demand; advantageous location of plants so that it could supply the needed product nearest its point of consumption, thus securing more sales because of saving in the freight rate to the consumer, and cheaper selling and administration costs because of larger operation under one management.

"The independent companies enjoy none of these advantages, and to secure them they must do one of two things. Either build plants supplemental to their own in different localities throughout the country, or combine their properties, or some of them, under one management so as to overcome the handicap to some extent.

"The first alternative would involve great expenditures of capital, which it would be difficult or impossible to raise because additional building would add to the already serious situation of over-production, and any return from such additional expenditures would be very doubtful, as they would have to await the increase in the country's consuming capacity.

"The unification of the Midvale-Republic-Inland companies will produce a unit having plants in Coatesville and Johnstown, Pa., Youngstown and Niles, Ohio; Chicago (Indiana Harbor), Illinois and Birmingham, Ala. In short, it will have plants in the principal consuming districts. Its product will be very much more diversified than the product of any one of the companies, and it will be in a position to stock steel products in the principal markets of the country so as to supply the demand at different points promptly and efficiently.

"The combination of these three companies will not

disturb competition in the steel industry. The output of the three companies is only 7½ per cent of the country's production.

"Some products of all three companies, or of some two of them, meet at common points or are sold within the same State. This is true, for instance, of structural shapes, plates, bars and sheets. The plants of the three companies are situated in Pennsylvania, Ohio and Indiana. That is to say, in the Eastern, Middle and Western districts. If circumstances are such that products of Midvale, Republic and Inland can meet at a common point, it must follow that products of all other plants located in any of the three districts can also be shipped to this same common point.

"If we take the actual shipments of the three companies which might have been considered competitive, say in the year 1920, and compare them with the potential competition from all other companies for that same year, we find that unification of the three companies might have eliminated competition in—

Structural shapes to the extent of 65/100ths of 1 per cent (0.65).

Plates to the extent of 1 7/100ths per cent (1.07).

Bars to the extent of 8/10ths of 1 per cent (0.80).

Sheets to the extent of 31/100ths of 1 per cent (0.31).

"In other words, the unification of these three companies would leave the following percentage of the total production of the United States in the field of competition:

Structural shapes	99.35
Plates	98.93
Bars	99.20
Sheets	99.69

"The men who are responsible for this unification realize that they can only hope by the resulting economies to cut off part of the cost differential or from \$3 to \$5 now enjoyed by the Steel Corporation, so we have planned a most conservative corporate structure in order that our interest charges shall be lower than the Steel Corporation's.

"The basis of the capitalization of the North American Steel Co. involves its assumption of the present outstanding bonds of the three companies. No new bonds will be issued. About 3,222,000 shares of new stock will be issued against 3,563,000 shares of the constituent companies. Additional working capital to the extent of \$20,000,000 cash will be provided by sale of common stock. Thus, upon the unification of the properties, the total shares of preferred and common outstanding will be about 3,812,000 compared with the present number of shares of the constituent companies, 3,563,000, and the additional number of shares will be accounted for by \$20,000,000 cash working capital added to the assets of the unified company.

"This makes our interest charges on bonds and preferred stocks about \$1.41 per ingot ton against the Steel Corporation's \$2.30."

The Opinion of the Attorney General

To the President of the Senate:

This communication is in response to a resolution passed by the Senate on May 8, 1922, a copy of which was duly transmitted to me. Without stopping to quote it in full, the resolution starts out with recitals that the public press has announced a proposed merger of seven steel companies, to be followed later by the inclusion therein of the Bethlehem Steel Corporation; that if such a merger takes place the corporation thereby formed will control the steel production of the country outside of that part in the hands of the United Steel Corporation, thereby placing monopolistic control of the country's entire steel production in the hands of two gigantic corporations. These recitals are then followed by requests to the Attorney General and the Federal Trade Commission to inform the Senate what steps they have taken to ascertain the purpose and effects of such a merger; the results of any investigation they may have made; what action they have instituted to protect the public interests; and that the Attorney

General inform the Senate whether he thinks it advisable to proceed under the Sherman Act and the Clayton Act to prevent the impending combination.

At the outset I think it proper to call attention to the fact that my predecessors have consistently adhered to the doctrine that the duties of the Attorney General are prescribed by statute; that he is a member of the executive branch and as such is under the guidance and supervision of the President; that for the legislative branch to direct his conduct is a measurable interference with the executive branch; and that he is under no duty to obey the mandates of one branch of the Government when not sanctioned by positive law. The opinions embodying these declarations are copied in the margin. A compliance with this resolution in all of its details demands a departure on my part from what has heretofore been regarded as settled law. I do not intend, however, to allow these rulings to stand in the way of making a full and comprehensive report; but it must not be inferred that by so doing I man-

test any intention to challenge the correctness of these rulings or to assail in the slightest degree the reasoning on which they are founded.

Two separate and independent mergers, unrelated to each other in any way, are in process of formation. One is between the Bethlehem Steel Corporation, owning plants in Pennsylvania and Maryland; and the Lackawanna Steel Company, whose plant is at Buffalo. The other is between the Midvale Steel & Ordnance Co., owning plants in Pennsylvania and in Delaware; the Republic Iron & Steel Co., owning plants in Ohio, furnaces in Pennsylvania and in Alabama, and certain plants at East Chicago and Muncie, Indiana, and at Moline, Illinois; and the Inland Steel Co., owning plants close to Chicago.

It will be conducive to a clearer understanding of the situation if I take these mergers up separately. In order to furnish the information which I called for it was necessary for these companies to set at work for many days a large clerical force to go through hundreds of thousands of invoices covering each individual sale for the years 1919, 1920 and 1921, and to tabulate the results. The figures for all these years are before me, but to set them all forth would require an inordinately long report. I shall therefore confine myself to the figures for 1920, which I think can be considered a fairly normal year. As every one knows, there was a heavy slump in the steel business in 1921, and the figures for that year can hardly be regarded as typical.

Bethlehem and Lackawanna Merger

To get an accurate idea of the scope of the activities of the Bethlehem and the Lackawanna, it will be well to present at the outset a list of the articles made by one company which are not made by the other. As to such articles there obviously can be no competition between the two. This process of elimination will eventually lead us to the products which are common to both.

The activities of the Bethlehem may properly be divided into main divisions, one representing the production of steel products, the other the building of ships. Of the selling value of its products in 1920, 61.39 per cent. was derived from the former; 38.61 per cent from the latter. Inasmuch as the Lackawanna does not engage in ship building activities, it is apparent that no competition between the two in this line of business can possibly exist.

Coming now to the division representing the production of steel products, the Bethlehem produces for sale a large number of articles which the Lackawanna does not. These include low phosphorous pig iron; spiegeleisen; ferromanganese; Mayari iron; girder rails for street car service; guard rails; high tee rails; rail braces; frogs; switches, crossings, special track work, switch stands, turntables, Bethlehem structural shapes, ship structural shapes, eye bars, cement mill balls, hollow forgings, press and hammer forgings, fluid compressed ingots, hardened steel rolls, drop forgings, shafting, die blocks, iron, alloy, steel and other highly finished bars, cold drawn bars, spring steel, file steel, rough turned bars, window sash sections, curb bar, barrel hoop sections, blue annealed sheets, black and galvanized sheets, tin and black plate, steel castings, manganese steel castings, cast iron and steel rolls, iron castings, tunnel segments, iron moulds, brass castings, puddle iron, staybolt iron, chain iron, electric tool steel, crucible tool steel, toe calk steel, armor plate, guns, gun forgings, gun mounts, carriage caissons and limbers, range finders, gun sights, air flask forgings, shell forgings, completed ammunition, cartridge cases, fuses, turret mechanisms, armor plate vaults, safe deposit boxes, large gas engines, large oil engines, heavy machinery, large pumps, machine tools, hydraulic presses, steel automobile wheels, cutting and punching tools, special bolts and nuts of all kinds, rivets, washers, tie rods, liner wedges, car and bridge knuckle and cotter pins, clevises, pole line material, turnbuckles, marine engines, Curtiss turbines, Diesel engines, Scotch and Yarrow boilers, condensers, marine auxiliaries, Weir pumps, Dahl fuel oil burners, valves and fittings, paraffine wax machinery, mining machinery, steel and

wood, sleeping, private, passenger, baggage and mail cars.

On the other hand, the Lackawanna produces for sale a number of articles which the Bethlehem does not. These include base plates; piling, plate piling, merchant steel bars, including rounds, squares and flats, agricultural shapes, auto sections.

The products produced by both companies for sale may with substantial accuracy be designated as follows: coke by-products, pig iron, blooms, billets, slabs and sheet bars, standard tee and light rails, rail joints, splice bars and tie plates, structural shapes, plates, universal and sheared, concrete bars, steel bridges, viaducts, buildings and pier caissons, railroad spikes, track bolts and nuts.

Taking the figures for 1920 as a basis, it appears that of the income received by the Bethlehem from its steel products division, 67.60 per cent was derived from products which the Lackawanna does not produce. In the case of the Lackawanna, 31.98 per cent was derived from products which the Bethlehem does not produce. Or to state the matter in a different way, the Bethlehem's income received from products common to both companies (including both the domestic and foreign trade) was 32.40 per cent; the Lackawanna's, 68.02 per cent.

In this connection it should be borne in mind that both companies engage in export as well as domestic trade. Inasmuch as the anti-trust laws differentiate between the two, it will be well to produce the figures showing the percentages of each. Of the total income, both domestic and export, received by the Bethlehem from its steel products division in 1920 on all articles, common to both companies, substantially 83 per cent was received from the domestic trade, and 17 per cent from the export. In the case of the Lackawanna, substantially 84 per cent was received from the domestic and 16 per cent from the export.

The following table shows the products in the domestic trade common to both companies in 1920, and the percentage of income represented by each such product to the total income on both common and non-common products, the Bethlehem's income from its shipbuilding activities being wholly disregarded in arriving at the percentages:

Articles	Bethlehem Per Cent	Lackawanna Per Cent
Coke and by-products	3.48	2.12
Pig iron, basic	2.12	2.24
Blooms, billets and slabs	2.06	1.08
Sheet bars	2.15	7.31
Rails—Standard	5.02	30.01
Rails—Light tee	0.06	1.53
Structural shapes, standard	8.82	10.21
Plates, 78 $\frac{1}{2}$ in. and under	2.23	7.82
Concrete bars, twisted	0.07	0.01
Rail accessories:		
Standard splice bars and continuous and 100 per cent joints	1.96	2.49
Bonanzo joints	0.19	0.06
Tie plates, standard	0.19	0.12
Railroad spikes	0.57	0.95
Track bolts	0.56	0.32
Total common products	29.48	66.27
Total all others	70.52	33.73
Total of both	100.00	100.00

Coming now to the products common to both companies, I shall take up each separately and present figures from which a fair idea of the extent of competition between the two can be obtained.

Coke and By-products: The products derived in the making of coke and tar, ammonia sulphate, naptha, benzol, toluol, motor fuel and gas. As might be inferred, the sale of coke and gas is not a normal incident of the steel business. The Lackawanna sold neither in 1920. All that was produced was needed for its own business. The tar is sold outright at the plants to purchasers in that locality. Of the various products, ammonia sulphate, motor fuel and benzol are, in the order named, the most important from the standpoint of revenue. The companies themselves do not engage in the sale of these products. They are delivered to an independent company, which disposes of them on a commission basis wherever a market can be found. Inasmuch as all concerns engaged in the manufacture of gas produce similar products, to say nothing of like products placed on the market by the United States

Steel Corporation through an independent selling agency, it will be seen how really unimportant are these items with respect to the matter in hand.

Pig Iron—Basic: The pig iron produced by both of these companies is primarily intended for their own use. The production of pig iron is, of course, the initial step in the manufacture of steel products. As both companies need pig iron in their operations, it is obvious that the sale of this article is but a mere incident. It not infrequently happens, however, that if a surplus is on hand at any particular time the companies are willing to dispose of the same; but this is usually done as a matter of accommodation to a steel manufacturer who happens to be in need of the particular product. In the year in question the entire production of all kinds of pig iron was 36,925,987 tons. Of this amount the Bethlehem produced 4.69 per cent; the Lackawanna, 2.87 per cent. The Bethlehem sold in the domestic trade 107,145 tons; the Lackawanna, 33,997 tons. At the present time the latter company is selling none. The only States in the New England district (Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island and Vermont) where both companies happened to ship in 1920 were Connecticut and Massachusetts; the Bethlehem shipping that year to Connecticut 6865 tons and to Massachusetts 374; the Lackawanna, 8315 tons to Massachusetts and 2337 to Connecticut. In the Eastern district (New York, Delaware, District of Columbia, Maryland, New Jersey, Ohio, Pennsylvania and West Virginia), the Bethlehem sold in that year 99,540 tons; the Lackawanna, 22,327. Of the amount thus shipped by the Bethlehem, about 57 per cent went to Pennsylvania; and of the amount thus shipped by the Lackawanna, about 65 per cent went to New York. The tonnage shipped by the Bethlehem to New York was slightly under 1200; while the Lackawanna's tonnage was slightly over 14,400. The Bethlehem shipped a large tonnage to Delaware; the Lackawanna shipped none. The Bethlehem shipped close to 10,000 tons to New Jersey; the Lackawanna shipped slightly over 4000 tons. The Lackawanna shipped a comparatively small tonnage to Ohio; the Bethlehem none at all. The Bethlehem shipped none at all to the Western district (Colorado, Idaho, Illinois, Indiana, Iowa, Kansas, Michigan, Minnesota, Missouri, Montana, Nebraska, Nevada, North Dakota, South Dakota, Utah, Wisconsin and Wyoming); the Lackawanna, only 440 tons. The Bethlehem shipped none at all to the Southern district (Alabama, Arizona, Arkansas, Florida, Georgia, Kentucky, Louisiana, Mississippi, New Mexico, North Carolina, Oklahoma, South Carolina, Tennessee, Texas and Virginia); the Lackawanna but 69 tons. The Bethlehem shipped to the Pacific Coast district (Alaska, California, Oregon and Washington) only 366 tons; the Lackawanna, 179.

While statistics are available showing the entire production of pig iron in the whole of the United States, there are none showing the total sales in each particular State. But when we stop to consider that of the total pig iron produced in the United States in 1920, the Bethlehem and the Lackawanna together produced but 7.56 per cent; it becomes at once apparent that any question of competition with respect to pig iron is a matter of small concern.

Blooms, Billets and Slabs: These are semi-finished rolled-steel products, being forms through which the steel ingot passes before its conversion into other steel products. Blooms, billets, and slabs are similar products, differing from each other merely in point of size. As might be implied, they are consumed for the most part by the company which produces them, although a small tonnage finds its way into the hands of some particular manufacturer of steel products. The total production of steel ingots in the United States in 1920 was 40,881,392 tons. Assuming a loss in the conversion of these ingots into blooms, billets and slabs of 15 per cent, which is ordinarily the case, the production of the latter was therefore close to 35,000,000 tons. The total tonnage sold by the Bethlehem in the United States in 1920 was 51,631; by the Lackawanna, 9408. In other words, their combined tonnage sold in the United States in that year was 61,039, the Bethlehem

contributing 84.59 per cent and the Lackawanna 15.41 per cent.

Sheet Bars: Statistics are not available showing the entire production in the United States. Like the items last discussed, sheet bars are a semi-finished rolled-steel product and constitute the material out of which sheets are made. Obviously, therefore, the purchaser of this product is usually some particular manufacturer of steel products. In 1920 the Bethlehem sold in the domestic grade 49,870 tons; the Lackawanna, 70,473 tons. In other words, out of a combined tonnage that year of 120,343 the Bethlehem contributed 41.44 per cent; the Lackawanna, 58.56 per cent. There were only six States to which sheet bars were shipped by either company in that year—New York, Delaware, Maryland, Ohio, Pennsylvania, and West Virginia. Of the 70,473 tons sold by the Lackawanna that year 66,248 tons, or 94 per cent of its entire tonnage, were sold in New York, while the Bethlehem shipped none at all to that State. Of the 49,870 tons sold by the Bethlehem that year, 26,803 tons were sold in Maryland and 17,168 in Pennsylvania, representing 88.17 per cent of its entire tonnage. On the other hand, the Lackawanna sold none at all in Maryland and only 1850 tons in Pennsylvania. Of the entire business transacted by these companies, blooms, billets and slabs constitute a very small part.

Sheet Plates—78½ Inches: No mention will be made of plates exceeding the size just mentioned, inasmuch as one of these companies does not produce them. In 1920 the sales made by these companies were distributed as follows: in the New England district, the Bethlehem 1564 tons, the Lackawanna 2720; in the Eastern district, the Bethlehem 37,626 tons; the Lackawanna 43,375; in the Western district, the Bethlehem 2408 tons, the Lackawanna 9612; in the Southern district, the Bethlehem 2500; the Lackawanna 368; in the Pacific Coast district, the Bethlehem 1946; the Lackawanna 5694. In short, out of a combined tonnage of 107,813, the Bethlehem contributed 42.71 per cent, the Lackawanna 57.29 per cent. It will be observed that 81.72 per cent of the total tonnage sold by the Bethlehem in 1920 found its way into the Eastern district as against 70.20 per cent on the part of the Lackawanna. Of the portion produced by both companies which found its way into the area described as Greater New York, the Bethlehem shipped 72 per cent, the Lackawanna 28 per cent. Of the tonnage produced by both which found its way into the rest of New York State, the Bethlehem shipped 8.62 per cent; the Lackawanna 91.38 per cent.

Concrete Bars—Twisted: In the entire United States the Bethlehem sold but 1192 tons; the Lackawanna, only 129 tons.

Structural Shapes: In point of tonnage and revenue this constitutes a very important item. There are two kinds known to the trade, the standard and the Bethlehem. The latter derives its name from the fact that it is made alone by the Bethlehem company under letter's patent. The manufacture of standard shapes is open to anyone. The total tonnage of structural shapes produced in the United States in 1920, both standard and Bethlehem, aggregated 3,306,748 tons. The Bethlehem shipped for the domestic trade 204,837 tons of standard; the Lackawanna, 88,877. In addition the Bethlehem shipped for the domestic trade 185,347 tons of the Bethlehem shapes. In other words, the percentage of the portion shipped by both companies in the domestic trade was 14.49 per cent of the total production in the United States. Of the total tonnage of both shapes shipped by the Bethlehem close to one-third was marketed in Pennsylvania alone, while slightly less than one-tenth was marketed in New York. The Lackawanna, on the other hand, shipped about one-ninth of its product to Pennsylvania and about one-quarter to New York. The Bethlehem shipped about one-thirteenth of its product to Ohio; the Lackawanna, about one-tenth. The Bethlehem shipped about one-sixth of its product to New Jersey; the Lackawanna scarcely any. In passing it may be

(Continued on page 246a)

World's Iron Ore Resources, 32 Billion Tons

That Is "Actual Reserves"—Potential Reserves Are Put at
Several Times That Amount—A Summary
by Countries and Districts

BY OLIN R. KUHN*

It is impossible to estimate closely the world's reserve of iron ore, because of the lack of available information on the unexplored fields and the varying iron content of the ores; but practically all authorities agree that there is a known reserve of from 30 to 35 billion tons of commercial ore.

According to Clarke, the American geologist, the crust of the earth contains 4.4 per cent of metallic iron, a small fraction of which has been concentrated by geological agencies to form commercial iron ore, and for every ton of these ores containing 60 per cent of metallic iron there are many tons that contain 50 per cent, many more tons that contain 40 per cent, and so on. Thus, as the iron makers or blast furnace operators are able to use the lower grades of ore at a

Extensive explorations have been made in the Americas and in Europe, so that considerable is known of the reserves of iron ore in these continents, but so little has been done in Asia and Africa that no dependence can be put on the estimates of reserves of these continents.

With a known reserve for the world of from 30 to 35 billion tons, assuming that the consumption of ore steadily increases, there is enough proved reserve to supply the requirements of the world for over 75 years. With a potential reserve of over 100 billion tons, there would probably be enough ore for between 150 to 200 years. It seems to be agreed by authorities that the reserve of iron ore in the world will be sufficient to supply the requirements for 200 years or more. Of



cost that is not prohibitive, vast reserves of ore will be available for commercial use.

Iron ores are divided into many classes, as Bessemer, non-Bessemer, low phosphorus, manganiferous, etc., and each class of ore is used for the specific kind of iron or steel that is to be made. What is prejudicial in one ore may be beneficial in another. A self-fluxing ore containing 35 per cent of metallic iron may be more valuable than a refractory ore containing 45 or 50 per cent iron. An ore high in silica content is generally objectionable, because of the additional limestone that is required to neutralize the acid content, thereby decreasing the output of the furnace and increasing the cost of the iron.

The physical condition of an ore is of the utmost importance. A very fine ore chokes the furnace and prevents the free passage of the gases and leads to excessive dust losses unless it is sintered or nodulized. A hard, dense ore, such as some magnetites, is refractory and is more costly to smelt than the less refractory ores.

course, this does not take into consideration the now uncommercial low grade ores or the vast unexplored regions.

Over 80 per cent of the known reserves of iron ore are located in five countries—Brazil, United States, France, Newfoundland and Cuba—although the United States is by far the largest producing country, mining from 35 to 40 per cent of the total world production. In 1917, the record year, 76,493,473 tons of iron ore was produced in the United States, 15,084,008 tons in the United Kingdom, and 22,464,780 tons in Germany. But since the war Germany has ceased to be a very large producer and France, by the acquisition of the Lorraine fields, has taken its place.

United States

The United States, which outside of Brazil contains the largest reserve of high grade iron ore in the world, the estimate being about 6½ billion tons, is divided into four districts:

Lake Superior District, including Minnesota, Michigan,

*Midvale Steel & Ordnance Co., Philadelphia.

gan and Wisconsin.

Southern District, including Alabama, Georgia, the Carolinas, the Virginias, Tennessee, Kentucky, Maryland, Arkansas, Missouri and Texas.

Eastern District, including New York, New Jersey, New England, Pennsylvania and Ohio.

Western District, including the States of the Plains, the Rocky Mountains and the Pacific coast region.

The Lake Superior district, the largest iron ore producing district in the world, sends out about 85 per cent of the ore mined in the United States. The normal supply from these fields is about 60 million tons annually and the ore is for the most part high grade hematite, averaging over 58 per cent metallic iron, dry content. There are various estimates of the reserves in this district, ranging from 1600 million tons to 3500 million tons, but good authorities agree that there is a reserve of about 3 billion tons of ore averaging over 45 per cent natural metallic iron content. The low grade ore, unavailable at present, is estimated at about 70 billion tons.

The Birmingham field in Alabama is the largest in the Southern district and the ore is for the most part hematite, averaging from 35 to 45 per cent iron and usually high in silica content. The estimate for the Southern district is about 2½ billion tons.

The ores of the Eastern district are generally magnetite, although some red hematite ores of the Clinton age are also found. The magnetites are as a rule low grade, averaging about 25 to 40 per cent iron, but they are usually concentrated, and this raises their iron content to 55 to 60 per cent. There has not been sufficient exploration in the Eastern district to give any close estimate, but it is safe to say there are 500 million tons of commercial ore in these States.

Very little is known about the ores of the Western district, which produces less than 2 per cent of the total output of iron ore in the United States. The ores are hematite, brown and magnetite and are as a rule high grade, running from 55 to 65 per cent iron content. The reserve is estimated at about 500 million tons.

Newfoundland

Newfoundland contains one of the largest iron ore reserves in the world, and it lies within a radius of five miles of Belle Island, in the Wabana basin, a greater part of it lying under Conception Bay. The ore is hematite and averages 48 to 57 per cent iron and 6 to 12 per cent silica. The Stockholm report credits Newfoundland with 3635 million tons of ore.

Canada

There are no large proved reserves of iron ore in Canada, although some is found in New Brunswick, Nova Scotia, Quebec, Ontario, Alberta and British Columbia. Recently there has been a report of a large body of ore found south of Hudson's Bay, but little is known of it and no exploration has been done. The ores are both hematite and magnetite and average from 50 to 65 per cent iron content. Hatch estimates the reserve of Canada at 150 million tons.

Mexico

On account of its lack of fuel Mexico has never been explored for iron ore to

any great extent and the two coasts are the only places where deposits would be available for international trade. The ores found have been both hematite and

Iron Ores of the World—Reserves,

Country and District	Reserve in Million Tons			Kind of Ore
	Actual	Potential	Iron Content	
EUROPE:				
<i>United Kingdom</i>				
Northumberland-Durham	35.0	200.0	25-30	Carg.
Cumberland-Lancaster	35.0	100.0	50.00	Hem.
Cleveland	190.0	400.0	30.00	Oolitic
York and Derby		200.0	25-30	Carb.
Lincoln	250.0	450.0	33.00	Carb.
Leicester	62.0		30.00	Carb.
Leicester, Scallop, etc.	200.0	800.0	25-30	Carb.
Ruthland and Oxford	123.0	300.0	25-30	Carb.
Northampton	100.0	300.0	25-30	Carb.
Wiltshire and Kent		5.5	27.00	Cret.
Gloucester	2.5		36.00	Brown
Inverness, Scotland	10.0		23.00	Oolitic
Glasgow and Edinburgh	7.7	400.0	25-30	Carb.
South Wales		1,500.0	25-30	Carb.
Total United Kingdom	1,015.2	4,655.5		
<i>Norway</i>				
Sydvanger	108.8	310.0	68.00	Mag. Concen.
Sarreisen		43.0	35.00	Mag.
Salangen	21.4	34.0	35.00	Mag.
Lofoten Islands		50.0	35.00	Tit.
Sjaafeld and Melkedal		17.1	35.00	Mag.
Sulitjelma	9.0	17.7	62.00	Mag.
Dunderland	90.0	300.0	35.00	Mag. & Hem.
Eiteraada		13.0	35.00	Mag. & Hem.
Beitstad	8.5	23.0	48.00	Mag. & Hem.
Total Norway	237.7	808.1		
<i>Sweden</i>				
Kirunavaara-Luossavaara	365.0	840.0	54.00	Mag.
Ekstromberg	20.0	40.0	62.00	Mag.
Snappavaara-Leveanieni	50.0	61.7	60.00	Mag.
Gellivaare	129.0	115.7	51.00	Mag.
Ruoteayare		12.0	40.00	Tit.
Central Sweden	185.0	120.0	40.00	Hem.
Taberg		50.0	50.00	Mag.-Tit.
Total Sweden	749.0	1,239.4		
<i>Finland</i>				
Jussaro		30.0	38.00	Mag.
Pitkaranta	13.5	7.0	30.00	Mag.-High Sul.
Total Finland	13.5	37.0		
<i>Germany:</i>				
West Rhine	4.0	0.5	30.00	Brown
East Rhine-Kalkberg	3.5	4.0	40.00	Brown
Siegerland	116.0	50.0	38-40	Carb.
Lahn-Dill	166.0	100.0	48.00	Brown & Hem.
Westerwald-Taunus	15.7	15.3	35.00	Brown
Spessart	3.5	3.5	33.00	Carb.
Weser-Salzgitter	248.0	1,000.0	30.00	Brown & Ool.
Harz Mountains	20.5	55.0	45.00	Brown & Hem.
Kellerwald	4.0	8.0	48.00	Brown & Hem.
Lower Hesse	1.5	2.0	40.00	Brown
Bentheim		200.0	30.00	Brown
Teutoburger Wald	20.5	100.0	35.00	Brown & Carb.
Oolitic Ores	20.0	100.0	32.00	Oolitic
North and Central Germany	8.0	8.0	30.00	Bog Ore
Thuringia	52.0	105.0	45.00	Silic. Carb.
Bavaria and Wurttemberg	42.0	1,100.0	35.00	Brown
Silesia	0.6		50.00	Mag.
Total Germany	725.8	2,851.3		
<i>Luxemburg:</i>				
Lorraine Field	200.0	70.0	25-40	Brown
<i>Belgium:</i>				
Mamur and Liege	7.1	7.1	35.00	Hem.
Antwerp and Limburg		66.0	35-40	Brown
Total Belgium	7.1	73.1		
<i>France:</i>				
Lorraine	4,800.0	1,500.0	25-40	Brown
Haut Marne	13.5	10.0	40.00	Brown
Dilette	50.0	50.0	55.00	Mag. & Hem.
Calvados Manche	175.0	2,000.0	47.00	Oolitic
Brittany and Anjou	250.0	500.0	50.00	Mostly Brown
Pyrenees-Orientales	30.0	30.0	54.00	Spathic
Total France	5,318.5	4,090.0		
<i>Spain:</i>				
Lugo	70.0	40.0	48.00	Brown & Spa.
Leon	25.0	100.0	49-52	Brown
Oviedo	60.0	50.0	57-64	Brown & Hem.
Santander	20.0		55.00	Brown
Vizcaya	35.0	30.0	49-42	Brown & Hem. Calc.
Guipuzcoa and Navarra	8.0	4.0	52.00	Hem.-Calc.
Logrono		20.0	32.00	Low Grade
Saragossa	34.0		60.00	Hem.
Terrel and Guadalajara	130.0	60.0	50.00	Brown
Badajoz	7.0	7.0	55-66	Hem. & Mag.
Huelva	174.0		51-58	Brown & Mag.
Seville	18.0	18.0	50.00	Brown & Mag.
Malaga	10.0		55.00	Brown & Hem.
Granada	17.0	10.0	50-59	
Almeria	45.0	24.0	50-59	
Murcia	25.5	10.0	50.00	Mangan.
Total Spain	678.5	373.0		
<i>Portugal:</i>				
Mancorvo	10.0	25.0	40-60	Brown
Serra dos Montes	3.0		55-63	
Porto de Moz	1.0	2.0	55-60	
Sao Thiao de Cacem	3.0		30-40	Mangan.
Total Portugal	17.0	27.0		

magnetite, averaging 55 to 65 per cent iron, and most of the deposits are located in the states of Guerrero, Michoacan, Oaxaca and Pueblo. The International Ge-

logical Congress placed the reserve of Mexico at 55 million tons, but more recent explorations have shown that the reserve is far greater than this.

Average Iron Content and Kind of Ore

Country and District	Reserve in Million Tons		Iron Content	Kind of Ore
	Actual	Potential		
<i>Switzerland:</i>				
Alp Mountains	1.0	1.0	42.00	Tit.
Kreuz-Planplatten	2.5	2.5	30.00	Ool. & Sil.
Total Switzerland	3.5	3.5		
<i>Italy:</i>				
Liga	2.5	.....	60.00	Hem. & Mag.
Sardinia	6.0	.....	45.00	Ool. & Mag.
Val d'Aosta	2.0	.....	55.00	Mag.
Central Italy	10.5	6.0	40.00	Brown
Total Italy	21.0	15.0		
<i>Austria:</i>				
Carinthia-Huttenberg	7.0	.....	50.00	Brown & Sid.
Styria-Erberg	210.0	150.0	50.00	Brown & Sid.
Total Austria	217.0	150.0		
<i>Czechoslovakia:</i>				
Bohemia	50.0	18.0	35.00	Ool. Hem.
Bohemia	35.0	100.0	38.00	Brown
Total Czechoslovakia	85.0	118.0		
<i>Poland:</i>				
Jurassic Ore	32.5	210.0	30-35	Brown & Spa.
Bog Ore	2.0	2.0	30-35	Brown & Spa.
Total Poland	34.5	212.0		
<i>Romania:</i>				
Huned	3.7	13.3	44.00	Brown & Carb.
Banat	2.5	10.0	40.00	Brown & Spa.
Total Romania	6.2	23.3		
<i>USSR:</i>				
Vares	21.0	40.0	45.00	Hem. & Sid.
Kopas	40.0	50.0	45.00	Brown-Chrom.
<i>Russia:</i>				
Moskva Basin	300.0	400.0	40.00	Brown
Voronezh and Tamlof	50.0	75.0	40.00	Brown
Ord and Kursk	.....	37.0	40.00	Brown
Krivo Rog	50.0	100.0	50-70	Hem.
Kerch	100.0	200.0	40-45	Oolitic
Caucasus	10.0	30.0	62.00	Mainly Mag.
Ural Mountains	2.0	1.0	40-60	Hem. & Mag.
Perm & Viatka	20.0	20.0	22.00	Siderite
Gora Blagodat	10.0	10.0	27.55	Hem. & Mag.
Versk Isets	6.5	.....	50-60	Brown & Hem.
Alapalevsk	30.0	50.0	44.00	Brown
Bakalsk	26.0	10.0	50.00	Brown
Magnitnaya Gora	25.0	25.0	45.00	Hem. & Mag.
Total Russia	629.5	958.0		
Total Europe	10,000.5	15,785.2		
ASIA:				
<i>India:</i>				
Bengal and Central Prov.	400.0	.....	64-69	Hem. & Mag.
<i>China:</i>				
Ta-Yeh and Pen-Hsi-Hu	400.0	.....	60-62	Hem. & Mag.
<i>Japan:</i>				
Kamaishi	20.0	.....	55-60	Mag.
Total Asia	820.0	457.0		
AFRICA:				
<i>North Africa:</i>				
Tunis and Algeria	150.0	.....	50-60	Hem.
<i>South and West Africa:</i>				
French West Africa	100.0	.....	62.00	Hem.
<i>Australia:</i>				
New Zealand—N. S. Wales	136.0	.....	50-68	Brown & Hem.
Total Africa	386.0	.....	
NORTH AMERICA:				
<i>Newfoundland:</i>				
Bell Island	3,635.0	.....	48-57	Hem.
<i>Canada:</i>				
Total Canada	150.0	.....	46-66	Hem. & Mag.
<i>United States:</i>				
Lake Superior	3,000.0	.....	54-62	Hem.
Southern District	2,500.0	.....	32-45	Hem.
Eastern District	500.0	.....	25-65	Mag.
Western District	500.0	.....	45-69	Hem. & Mag.
Total United States	6,500.0	70,000.0		
<i>Mexico:</i>				
West Coast	55.0	.....	42-67	Hem. & Mag.
<i>Cuba:</i>				
Oriente-Mayari	600.0	.....	40-50	Brown Hem.
Levisa	75.0	.....	40-50	Brown Hem.
Mos	1,985.0	.....	40-50	Brown Hem.
Camaguey	450.0	.....	40-50	Brown Hem.
Pinar del Rio	40.0	.....	55-65	Mag. & Hem.
Total Cuba	3,150.0	12,000.0		
Total North America	13,340.0	82,000.0		
SOUTH AMERICA:				
<i>Peru:</i>				
Orinoco	500.0	.....	65-68	Mag.
<i>Colombia:</i>				
Valparaiso	.....	.....	55-68	Mag.
<i>Brazil:</i>				
Minas Geraes	7,500.0	.....	60-70	Hem.
Total South America	8,000.0	.....	
Total World Reserve	32,555.5	98,242.0		

Cuba

About 90 per cent of the Cuban ores are brown and hematite and are found on the northeast coast of the Oriente Province. The famous Mayari field lies in this district. The ores average from 40 to 50 per cent iron, 6 to 14 per cent alumina, 1 per cent nickel, and 1.5 per cent chromium; but on account of the high moisture and sulphur content it is necessary to roast them before they are desirable for commercial use. The reserves of Cuba are estimated at 3 billion tons. Cuba has no iron industry and exports its entire production of ore. About 80 per cent of the ores in Cuba reserve are owned by four steel companies in the United States.

Venezuela

The ore deposits of Venezuela are located in the delta of the Orinoco River and the ore is generally magnetite. Eckel estimates that Venezuela and Chile have 500 million tons of high grade ore.

Chile

The iron ores of Chile are scattered along the west coast north of Valparaiso and consist chiefly of high grade hematite. The Bethlehem Steel Co. is operating a property at Tofo which is said to contain 200,000,000 tons of ore.

Brazil

Brazil has probably the largest undeveloped iron ore reserve in the world, being estimated by Merriam and Leith at 7½ billion tons averaging from 60 to 70 per cent iron. The principal deposits are located in the State of Minas Geraes, but so far little ore has been produced.

United Kingdom

The bulk of the ore in the United Kingdom is found in England and is of the carbonate variety, averaging from 25 to 35 per cent iron. Roesler estimates the known reserve at about 1015 million tons. England does not produce enough ore for its consumption and must draw upon Spain, Norway and Sweden.

Norway

The greater part of the iron ores of Norway are low grade magnetites, averaging about 35 per cent iron, and must be concentrated before they are desirable for furnace use. The Sydvaranger and Dunderland deposits are the largest, and the other deposits average from 50 to 60 per cent iron. The known reserve is estimated at about 237 million tons. Norway has no iron industry and exports practically all of its ore production.

Sweden

Sweden is renowned for the great purity of its iron ores. The largest deposits are in the north of Sweden and the ores, generally magnetite, contain about 62 per cent iron and are low in sulphur. The known reserve is estimated at about 750 million tons. Sweden exports over 80 per cent of its ore production.

Germany

Since the war, by the loss of the Lorraine fields, the reserves of Germany

have been greatly reduced. The ores are, as a rule, low grade brown or hematite and in some cases must be roasted to reduce the moisture. Germany without the Lorraine field only produces 5 to 10 million tons annually, while in 1913 she consumed 48 million tons, so that in the future she will have to import a great part of her ore. About 90 per cent of the reserves, which are estimated at about 725 million tons, are located in the Rhine and Wesser fields.

Luxemburg

The Luxemburg deposits lie in the Lorraine basin and are estimated to contain about 200 million tons. These ores are controlled and consumed by Germany.

Belgium

The Belgian iron ore deposits are small and are generally low grade brown ore averaging from 35 to 40 per cent iron and high in phosphorus. They are located in the Antwerp-Limburg district and the known reserve is estimated at only 7 million tons. The ore

are the largest. Spain produces 8 to 10 million tons of iron ore annually, most of which is exported, and the reserve is estimated at 678 million tons.

Portugal

The deposits of Portugal are small and the ores average from 40 to 60 per cent iron. Portugal has no iron industry. The reserves are estimated at about 17 million tons.

Italy

There are no large deposits of iron ore in Italy, the largest being the Val D'Aesta in the north, which has a known reserve of about 6 million tons. The ores are high grade magnetite low in phosphorus. Roesler credits Italy with a total of 10 million tons, and Italy and Switzerland with a reserve of 14 million tons. Italy produces about 1,000,000 tons of ore per year, which is consumed in Italian furnaces.

Austria

The only deposits of iron ore in new Austria are the

Iron Ore Produced in Some Principal Countries, 1913 and 1916-1920, in Metric Tons. Table from "Mineral Resources, 1920," Part I

Country	1913	1916	1917	1918	1919	1920	Source of Data ^a
North America:							
Canada ^b	279,084	249,638	195,317	191,967	178,869	115,961	1913-1920, 1.
Cuba ^b	1,607,750	724,119	562,341	653,829	363,522	896,952	1913-1920, 2.
Newfoundland ^b	1,456,859	918,121	801,172	769,809	453,565	585,074	1913-1920, 1.
United States	62,972,124	76,370,355	76,493,473	70,772,810	61,943,913	68,689,517	1913-1920, 2.
South America:							
Chile	14,100	56,166	5,000	2,743	.....	.....	1913-1917, 3; 1918-1920, 2.
Venezuela ^c	58,141	.....	.....	.....	.....	.....	1913, 4.
Europe:							
Austria-Hungary	5,318,531	(d)	3,744,656	(d)	(d)	(d)	1913, 5; 1917, 30.
Belgium	150,450	30,430	17,000	500	4,820	(d)	1913-1919, 6.
France	21,917,870	1,680,684	2,034,721	1,671,851	e9,412,786	e13,871,187	1913-1918, 7; 1919-1920, 9.
Germany	e28,697,903	e21,333,664	e22,464,780	e18,392,569	(d)	(d)	1913-1917, 10; 1918, 10 and 11.
Greece	313,578	84,985	63,364	67,871	46,939	44,751	1913-1917, 12; 1918, 30; 1919-1920, 8.
Italy	603,116	942,244	993,825	693,872	613,025	423,300	1913-1919, 13; 1920, 8.
Luxemburg	7,333,382	6,957,854	4,502,692	3,131,400	3,111,602	(d)	1913-1917, 10; 1918, 11; 1919, 30.
Norway	544,686	417,899	302,739	95,887	(d)	(d)	1913-1918, 14.
Portugal	49,182	2,261	7,381	.....	8,712	12,845	1913, 5; 1916-1918, 30; 1919-1920, 8.
Russia	9,513,945	(d)	(d)	(d)	(d)	(d)	1913, 15.
Spain	9,861,668	5,856,861	5,551,071	4,692,651	4,640,061	4,767,693	1913-1919, 16; 1920, 8.
Sweden	7,475,571	6,986,298	6,217,172	6,623,661	4,981,110	(d)	1913-1919, 17.
United Kingdom	16,254,085	13,711,247	15,084,008	14,847,571	12,450,875	12,911,430	1913-1920, 18.
Asia:							
China	7423,003	278,555	304,356	e382,719	e640,420	e682,938	1913, 19; 1916-1917, 5; 1918-1920, 30.
Chosen	142,012	245,355	140,613	202,882	423,267	(d)	1913-1916, 4; 1917, 30; 1918-1919, 20.
India	376,707	418,418	419,991	500,607	572,798	(d)	1913-1919, 21.
Japan	171,656	158,815	(d)	232,436	204,816	(d)	1913-1916, 4; 1918-1919, 22.
Africa:							
Algeria	1,348,899	1,042,865	985,293	902,465	735,579	1,071,278	1913-1918, 7; 1919-1920, 23.
Rhodesia		4,887	4,799	5,765	2,268	.....	1916-1920, 24.
Tunis	597,500	500,935	605,958	421,543	(d)	(d)	1913-1918, 7.
Union of South Africa	.....	.....	.....	4,426	3,268	2,326	1913-1920, 25.
Oceania:							
Australia —							
New South Wales ^d	75,981	95,626	97,840	120,548	140,134	161,294	1913-1919, 26; 1920, 8.
Queensland	41,031	44,870	25,467	43,469	25,072	20,025	1913-1919, 20; 1920, 8.
Southern Australia	61,632	191,352	333,657	261,154	272,840	419,667	1913-1920, 28.
Philippine Islands	(d)	(d)	(d)	(d)	18,598	(d)	1919, 29.

^a 1. Canada Dept. Mines. Mines Branch; U. S. Geol. Survey; 3. Anuario estadístico de la República de Chile; 4. Bur. Foreign and Domestic Commerce; 5. National Federation of Iron and Steel Manufacturers (London); 6. Statistique des Industries Extractives et Métallurgiques; 7. Comité Central des Houillères de France, No. 5532; 12. Tableaux Statistiques du Mouvement Minier; 13. Rivista del Servizio Minerario; 14. Norges Offisielle Statistik; 15. Russian Gornago Dept. Mining and Metallurgical Industries; 16. Estadística Minera de España; 17. Bergshantering Sveriges Officiella Statistik; 18. Mines and Quarries (London); 19. Iron Trade Review; 20. Official data furnished by American consul-general, Keijo (Seoul), Chosen, and American Embassy, Tokio, Japan; 21. Records Geol. Survey of India; 22. Mining Industry of Japan; 23. Consular Report; 24. Rept. Secretary for Mines; 25. Ann. Rept. Dept. Mines and Industries; 26. Ann. Repts. Dept. Mines; 27. Ann. Repts. Under Secretary for Mines; 28. Review of Mining Operations, Dept. Mines; 29. Mineral resources of the Philippine Islands; 30. Imperial Mineral Resource Bureau, London. ^b Shipments. ^c Exports. ^d No data available. ^e Includes Lorraine, ^f From Tayeh deposit. ^g Includes iron ore from State mines received at Eskbank Iron Works, Lithgow, also ironstone for flux and iron oxide.

production of Belgium is very low and practically all of the ore it consumes is imported from France.

France

France ranks next to the United States and Brazil in reserves of available iron ore, the largest deposits being those of the Lorraine basin. France at present will produce about 40 million tons annually. The Lorraine ores are of the low grade brown type, averaging from 25 to 40 per cent iron, and are generally high in phosphorus. The other deposits in Normandy and Brittany are hematite and average about 50 per cent iron. Roesler estimates the reserve of France, including Lorraine, at 5318 million tons, the Lorraine field alone containing 4813 million tons.

Spain

Deposits of iron ore are scattered all through Spain, and the ores are generally brown, hematite, and spathic, averaging from 50 to 65 per cent metallic iron and low in phosphorus. The Huelva deposits in southern Spain

Erzberg deposits of Styria and the Hüttenberg deposits of Carinthia. The ore is as a rule low grade and must be roasted before it is suitable for use. The reserves of Austria are placed at about 217 million tons.

Czecho-Slovakia

The largest ore deposits in Czecho-Slovakia are in Bohemia and Ruthenia. The ore is generally low grade hematite and brown, averaging about 35 per cent iron, and must be roasted to reduce the moisture. Czecho-Slovakia has a reserve of about 85 million tons and produces from 2 to 3 million tons annually.

Poland

The main deposits of Poland are Jurassic and bog ores averaging from 30 to 35 per cent iron, and the known reserve is estimated at only about 35 million tons.

Rumania

There are no extensive iron ore bodies in Rumania

and the reserve is estimated at only about 6 million tons of carbonate ore, averaging about 44 per cent iron. Rumania has no iron industry and produces practically no ore.

Jugo-Slavia

The only ore found in Jugo-Slavia is in Bosnia, and it is of the hematite variety. The reserve is estimated at 21 million tons. The production is very small and the ore is used in the furnaces of Trieste.

Greece

The principal deposits of iron ore in Greece are the chromiferous hematite ores near Lake Kopais. They average about 45 per cent iron and 2 per cent chromium and the reserve is placed at about 40 million tons. Practically all of the ore is exported. There are several small deposits of manganiferous ores in the islands of Syra, Cerigo, Zea, Thermia and Serpho.

Russia

The largest bodies of iron ore in Russia are found in the central and southern parts of the country and the most extensive of these are the deposits at Lipetsk, but the ore averages only about 40 per cent iron. Some high grade hematite ores averaging from 50 to 70 per cent iron are found in the southwest around Krivoi Rog. Russia produces about 10 million tons annually and the reserve is estimated at about 630 million tons.

India

The main deposits of India are hematite similar to those of the Lake Superior district in the United States and are located at Mayurbhanj and Singhum in Bihar and Orissa, Clanda and Drug in the central provinces, and Kadur in Mysore. The ores are high grade, averaging about 60 per cent metallic iron, but on account of the small portion of India that has been explored no very correct estimate of reserves can be given. The known ores are estimated at about 400 million tons, running above 60 per cent in iron.

China and Korea

As with the rest of Asia, very little is known about the iron ores of China. The largest known deposits are at Hanyang in Hu-Pei Province, which are estimated to contain over 100 million tons of hematite ore, and the magnetite deposits of Pen-Hsi-Hu, which are said to contain another 100 million tons of commercial ore. The ore is high grade, ranging from 50 to 65 per cent iron. Foster Bain, chief of the United States Bureau of Mines, gives the reserve of China and Korea at 400 million tons of known ore, although all authorities seem to agree that the undiscovered ores will prove many times that amount.

Japan and Chosen

The iron ores of Japan are widely distributed and the total available tonnage is fairly large, but no single large deposit is known. There are five producing deposits, the Kamaishi, Nakakasaka, and Hitekabe, which contain magnetite, and the Sennin and Chugeku deposits, which are hematite. The Kamaishi deposit is probably the largest and the ore will average from 55 to 60 per cent iron. Ineuye estimates the known reserve of Japan at 20 million tons.

North Africa

The only data on iron ore deposits in northern Africa show deposits in Tunis, Algeria and Morocco. The ore found is generally hematite and averages from 50 to 60 per cent iron. Eckel gives the reserve of these three countries as 150 million tons.

East and Southeast Africa

Brown hematite ores have been found in Egypt and the Soudan, but the deposits are scattered and little is known of them. Some magnetite ores are reported from Uganda, British Somaliland, and East Africa Protectorate, and there are large bodies of ore in the Congo and German East Africa, but no estimates of reserves are given for any of the deposits.

South and West Africa

Various types of ore are found in South and West Africa somewhat similar to those found in Cuba. They are generally of high silica and alumina content and fairly high in iron. One deposit in French West Africa has been found recently to contain a reserve of about 100 million tons, and others are found in Rhodesia and Transvaal, but like the rest of Africa, little is known of the amount of reserve tonnage.

Australia

Although no definite estimates are given of the reserve of ore in Australia, high grade hematite is found in New Zealand, New South Wales and Tasmania in considerable quantities, with scattered deposits in Victoria, Queensland, West and South Australia. Sjogren estimates the total for Australia at 136 million tons.

Summary

The above countries show a total reserve of known ore of 32,555,500,000 tons, equivalent to about 15,000 million tons of metallic iron, and the potential or possible ore will probably reach 100 billion tons. F. H. Hatch in 1920 estimated the actual reserve at 31,800 million tons and Sjogren in 1910 estimated it at 32,408 million tons, with a potential reserve of over 125 billion tons. E. C. Eckel in 1914 estimated the known ore at 34,792 million tons, with a potential reserve of over 90 billion tons.

Great Tonnage Moved at Steel Plants

YOUNGSTOWN, July 25.—Dependence of operations of important iron and steel properties on transportation is again being emphasized in curtailments following in wake of shopmen's strike. Within the plants of large industrial companies an astonishing volume of material is being constantly moved by rail.

"Transportation is of vital importance in a large industry," states V. W. Delaney, superintendent of transportation of the Youngstown Sheet & Tube Co. "Every commodity entering into manufacture must be handled by rail and all finished material likewise.

"Our plant has handled a maximum of 32,000 cars in one month to and from railroads, averaging better than a thousand a day. Every car averages five separate moves from its arrival to departure from our tracks, making a grand total of approximately 5000 car movements per day and necessitating almost clock-like work to avoid delays to some department or group of workmen.

"The greatest co-operation must exist between the more than 150 foremen ordering work, and the car department. Locomotives cost about \$7 per hr. to operate, and a wrong order from a department causing unnecessary work is a costly thing for the company.

"The freight tonnage required to be handled in the normal operation of our plants amounts to more than 5,000,000 tons of inbound freight, 1 1/4 million tons of outbound and 1,000,000 tons of intra-mill between departments, making a grand total of more than 7,000,000 tons of freight to be handled on our tracks per year. This includes 30,000 cars of ore dumped through our car dumper."

Ignition of Coal Dust by Electric Arcs

The extensive use of pulverized coal for fuel in industrial plants gives interest to tests recently made by the United States Bureau of Mines, which proved that coal dust suspended in air can be exploded by electric arcs under conditions that might prevail in a pulverized coal plant or in a coal mine. If there is electrical machinery in places where coal dust is apt to collect in quantities capable of producing a dust cloud, such electrical machinery should be housed in compartments designed especially for use in dusty atmospheres. Under Schedule 2B, the Bureau of Mines is prepared to conduct investigations looking toward the safety of electrical equipment for this class of service. Details of tests of the ignition of coal dust by electric arcs are given in serial 2365 just issued by the Bureau of Mines.

THE 8-HOUR DAY IN GERMANY

August Thyssen Considers It a Misfortune Under Present Conditions

IN a recent issue of *Stahl und Eisen* an article appeared, commemorating the 80th birthday of August Thyssen, the well-known German iron master. His career is traced from the building of a small plant in 1871 having five puddling furnaces and two rolling mills, the production in the first year amounting to about 3000 tons. Of particular interest to his American friends is the reproduction in the article of a letter he wrote a short time before to the *Mülheimer Zeitung* on the occasion of its 50th anniversary. What Mr. Thyssen says of hours of labor in German industries in their relation to the country's ability to rise from its prostrate position is of special significance. The letter is as follows:

"Consideration of the past, when one thinks of the outstanding anxieties and successes of his work, always gives a certain satisfaction. If, however, one directs his glance forward and tries to look into the future, he is faced with complete uncertainty, and as conditions are at present the outlook is only dark. We have a terrible war behind us, we have experienced hard war years with many privations from which scarcely anyone has been exempt. We have lost the war; we have heavy war burdens to bear, and only dark prospects meet our eyes. We hope for a savior who will deliver us from our distress, but no one knows whence the savior will come. From without certainly no savior can or will come to us; if deliverance comes it can only come from within ourselves.

Work the Only Way Out

"And this deliverance can only lie in work. As work keeps the individual man healthy and sound, so it alone can keep a nation healthy; and on the other hand a nation like ours, which is sick through the war and war conditions, can only be made well again by work. It is a splendid thought that to each man who works there comes a share in the joy of living. I believe that I dare safely say that in general before the war it was the case that each man who was industrious and worked, even if he had a large family to support and because of that had much anxiety, had yet a share in life's enjoyment, even if sometimes perhaps in different amount from others who lived under more favorable conditions.

"It is no part of my intention to discuss the eight-hour day, whether it is really the ideal of the working class, and whether in that is its happiness and the solution of the great living and economic questions. I should be genuinely glad if the times were such that this ideal could be realized. But I am thoroughly sure that the mechanical eight-hour day, as it has been brought in by the revolution, especially in the present times, is a great misfortune for Germany. With a rigid eight-hour day, that for many men on hard work is thoroughly justified but for light work is just as strongly unjustified, we shall not come out from the difficulties in which we find ourselves to-day, and from which we absolutely must come out, come what may, by working ourselves out.

"We can only bring our political administration again to convalescence (especially after the great weakening that it has experienced through the loss of the industrial regions in Lorraine and Upper Silesia which are so important for Germany) by raising our industrial efficiency above the normal, and increasing

it to the utmost. We must create values, because without the creation of new values it is impossible to bring the financial conditions of the country again into order.

Community Thought Must Be Cultivated

"We must create values in order to be in position to bring in raw materials, which we lack, from foreign countries, and with them operate our plants to give possibilities for work and wages; and on the other hand to again create values for export and thereby pay for increased imports that we use for the nation's nourishing. In order to reach this it is necessary that the German people themselves reflect and finally bring into use the community thought, about which there has been so much talk but so little action. In recent years, unfortunately (no other designation can be used), a tremendous amount of harm has been done with shibboleths or phrases, but the world cannot be governed with phrases, and I have not found that with them bread is created for the needy.

"The world is full of discontent, there is constantly talk of contrasts, which are thereby aggravated. Every logical man knows that there have always been differences, also class differences, which never can be equalized, and there will therefore always be economic differences. There is constant talk of equality and equal rights which will finally only amount to a desolate uniformity. No one will believe that the able and industrious can endure or will allow being placed on the same level as the idlers, but each must admit that if all were made equal through whatever agency or law the more able and diligent would again raise themselves above the unfit.

"On the one side one reads of the solidarity of the hand and head worker, on the other always of the opposition between proletariat and capital. I suppose I shall be counted in the class of capitalists, but however that may be I am conscious of having worked during my life just as hard as the most able and industrious of the workmen that have worked in the plants of my firm or in other plants.

Capital Interest and Common Interest

"What capitalist and plant owner can have personally of real profit is really little, not even an old age free from anxiety. I believe I dare say without exaggeration that from my life work the general community has had more profit than I myself. What I have created and worked out remains finally to the whole community, because I can carry nothing with me to the other life.

"When I look over everything I can only say that I mostly regret that always prominence is given to that which separates us whether in regard to religious, political or social considerations. On the other hand we have still many things common to the German people, which unite us, and to accentuate these things is far better in my opinion than always to talk of those things which separate us.

"Whether we live under a monarchical or democratic constitution is finally the same if the nation in itself is able and there are able leaders to lead it and give it regulation whereby our national and economic life will be made sound and our fatherland come to honor both at home and abroad. But the chief thing is that we ourselves as German people perceive and form a national community, which without misconstruing and worrying over petty jealousies and the constant bringing up of oppositions, will cultivate the conviction that all, whether high or low, poor or rich, hand-workers or head-workers, together form one nation in the good of which each one has the greatest interest, and to work together should receive from each the highest allegiance.

"The times are hard; the outlook is dark. If one would maintain alive the small gleam of optimism that

we still have within us, then we must make sound the national community spirit, hold together unreservedly, work together and save our earnings as much as possible instead of squandering our money in excessive and frivolous methods of living as seems to be so much the case with the young people.

"As I have said before, the best means of becoming healthy and at the same time the most simple, is and remains work. Only through constant, industrious and hard work, combined with the greatest economy will it be possible for us, even though slowly, to work out of the distress in which we find ourselves today. It is just as certain that without this increased joy and efficiency in work our people and the fatherland that we all love, whatever color we may be known by, must go down in misery."

French Iron and Steel Production for May

PARIS, FRANCE, July 11.—The following figures just given out officially at Paris show the production of iron and steel in France during the month of May, 1922, with totals for the current year so far:

Iron, Metric Tons			
	Preceding For May, 1922	Months, 1922	Total for Current Year to May 31
From coke furnaces.....	435,426	1,385,267	1,820,693
From electric furnaces.....	6,780	17,792	24,572
Total*	442,206	1,403,059	1,845,265*
Detail of Production			
Forging iron	21,170	76,240	97,410
Foundry iron	102,919	317,025	419,944
Bessemer	1,682	1,727	3,409
Thomas	300,384	949,883	1,250,267
All other iron.....	16,051	58,184	74,235
Steel, Metric Tons			
Ingots	356,957	1,296,054	1,653,011
Castings	6,846	26,550	33,396
Total*	363,803	1,322,604	1,686,407*
Method of Making			
Converter:			
Acid	2,479	6,871	9,350
Basic	238,708	800,971	1,039,679
Open-hearth furnaces	120,271	503,084	623,355
Crucible furnaces	509	1,896	2,405
Electric furnaces	1,836	9,782	11,618

*Of the above there was produced in disannexed Lorraine during the month of May, 1922, 190,301 tons of iron and 112,856 tons of steel.

Engineers Receive French Honors

Charles F. Rand, chairman of the Engineering Foundation, and Col. A. S. Dwight, president of the American Institute of Mining and Metallurgical Engineers, were decorated on July 20 with the Croix de Chevalier de la Legion d'Honneur by the French Government for distinguished service during the war. The decorations were conferred by Consul General Gaston Liebert, at a luncheon given in his honor at the Engineers Club, New York.

Mr. Rand is internationally known for his years of service in mining as the head of large iron ore properties in this country and Cuba. He is an honorary member of the British Iron and Steel Institute, past president of the American Institute of Mining and Metallurgical Engineers, and as the head of the Engineering Foundation is active in promoting industrial research in the United States. Colonel Dwight is a member of the American Engineering Council of the Federated American Engineering Societies.

M. Liebert said that reconstruction was going on rapidly in northern France, two-thirds of whose industries are now working. The French Government, he said, is planning water power improvement on a vast scale and as a result it would soon be unnecessary for France to import a single ton of coal. He urged that French students be sent to this country to study engineering. It was announced by Calvin W. Rice, secretary of the American Society of Mechanical Engineers, that M. E. de Margerie, director of the Geological Service of France, had been appointed as exchange professor to the United States in applied science and engineering. He will lecture during 1922-23 in seven American universities, starting at Columbia.

Appeals for Retaining Foreign Chemical Patents

Engineers have appealed to President Harding to protect patents sold to America. Dean Mortimer E. Cooley, of the University of Michigan, president of the Federated American Engineering Societies, has announced that a resolution adopted at a meeting in New York on July 14 of the Federation's committee on procedure says that the patents formerly owned by Germany and her allies, and, through the Alien Property Custodian, ordered returned from the Chemical Foundation, "have become the nucleus of our American synthetic organic chemical industry, which must be encouraged for the sake of scientific research, public welfare and national defence."

The hope was expressed that no action will be taken without hearing representatives of chemists, chemical engineers, chemical manufacturers, the medical profession and others most directly concerned. It was implored that nothing be done which can, in any way tend toward the ultimate return to former owners of patents or other property lawfully sequestered and sold to Americans.

Rate on Steel Tanks

WASHINGTON, July 25.—In a tentative report handed down last Friday in connection with a complaint of the Parkersburg Rig & Reel Co., Parkersburg, W. Va., Examiner Warren H. Wagner recommends that the Interstate Commerce Commission find that the rate on steel tanks, knocked down, in carloads from Casper, Wyo., to Bixby and other California points, taking the same rate, be found unreasonable to the extent that it exceeds \$1.50 per 100 lb., minimum 4000 lb. The complainant was charged the fifth class rate of \$2.84. The report states that the consolidated classification does not distinguish between plates and sheets not otherwise indexed by name. Tanks made of material No. 3 to No. 16 gage, inclusive, were rated the same as tanks made of No. 2 gage and thicker in carloads.

Rates on Wire Fencing

WASHINGTON, July 25.—The Interstate Commerce Commission, pending any action it may take regarding applications for relief from the long-and-short haul provision, has authorized rates on wire fencing east of the Mississippi River and south of the Ohio and Potomac Rivers, the same as the rates in effect on special or manufactured iron, in the same territory. It is provided that the rates shall not exceed those to intermediate points. The minimum weight on wire fences, fittings, posts, gates, etc., is 30,000 lb.

Studying Steel Suitable for Gages

Experimental work has been started by the Bureau of Standards in the study of the rate of or resistance to wear of steels when run in contact and without lubrication of any sort. The Amsler wear testing machine is being used for this investigation. The steels included in the preliminary studies form a series that has been submitted by the gage steel committee and which is being studied in detail to determine the suitability of the steels for gages. In gage work, the question of wear is of extreme importance.

More than 288,000 cars, trucks and buses were produced in the United States during June, according to Alfred Reeves, general manager the National Automobile Chamber of Commerce. This is a new high record in motor car production and is 12 per cent in advance of the May figures, 256,000. On this basis, Mr. Reeves predicts a total 1922 production of 2,000,000 motor vehicles. The total for the first six months passes the million mark by 137,000.

The Board of Public Service, St. Louis, has let the Worthington Pump & Machinery Corporation, Buffalo, the contract for the last of seven pumps for the Bissell Point high service station. The cost of the last unit is \$199,000.

Heat-Temperature Curves of Metals

Basis for Average and Instantaneous Specific Heat Values Provided by German Laboratory Tests—New Specific Heats for Molten Metal

BY JOSEPH F. SHADGEN*

CALORIFIC energy influences all materials in different ways. Besides increasing their volumes, the most important effects of heat on bodies are the variation of their temperatures and often the transformation of their physical form.

Heating a solid material raises its temperature proportionately to the amount of energy involved. This

ated, even in new issues of old publications, by the simple application of the law of least effort, because the majority of the recent test data is not only fractional, but also incoordinately spread in the multitude of technical magazines and reports of learned societies.

The notion of specific heat led to various complications; it was noticed by investigators that its value

Table I. Heat Content-Temperature Relations for Iron, Nickel and Cobalt

Temperature Deg. Cent.	Heat Content B.t.u. per Lb.	Iron			Nickel			Cobalt			
		Cal. per Kg.	Specific Heat Mean O° to T°	At T°	Heat Content B.t.u. per Lb.	Cal. per Kg.	Specific Heat Mean O° to T°	At T°	Heat Content B.t.u. per Lb.	Cal. per Kg.	Specific Heat Mean O° to T°
0	32	...	...	0.1055	20.66	11.47	0.1147	0.1200	18.14	9.52	0.0952
100	212	20.00	11.11	0.1111	0.1168	20.66	11.47	0.1200	18.14	9.52	0.0993
200	392	42.65	23.36	0.1168	0.1282	43.20	24.00	0.1200	35.73	19.85	0.0993
300	572	66.15	36.75	0.1225	0.1396	67.63	37.57	0.1252	0.1409	54.79	30.99
320	608	...	...	...	...	72.74	40.41	0.1262	0.1430	...	...
330	626	...	...	...	...	77.56	43.09	0.1306	0.1294	...	...
400	752	91.39	51.27	0.1282	0.1509	93.87	52.15	0.1304	0.1294	77.28	42.93
500	932	120.49	66.94	0.1339	0.1623	117.16	65.69	0.1302	0.1294	100.24	55.69
600	1,112	150.73	83.74	0.1396	0.1737	140.47	78.04	0.1301	0.1295	124.65	69.25
700	1,292	183.01	101.67	0.1452	0.1850	163.76	90.98	0.1300	0.1295	151.52	83.62
725	1,337	191.34	106.30	0.1467	0.1879	...	...	...	...	...	...
745	1,373	201.99	112.21	0.1506	0.1876	...	...	...	...	...	...
765	1,409	212.79	118.41	0.1548	0.1592	...	...	...	...	...	...
785	1,445	222.01	123.34	0.1571	0.1592	...	...	...	...	...	...
800	1,472	226.31	125.73	0.1572	0.1592	187.07	163.93	0.1299	0.1295	177.82	98.79
850	1,562	240.64	133.69	0.1573	0.1592	...	...	...	...	...	...
900	1,652	254.93	141.65	0.1574	0.1592	210.38	116.88	0.1299	0.1295	206.59	114.77
919	1,686	260.42	144.68	0.1574	0.1592	...	...	...	...	...	...
919	1,686	272.43	151.35	0.1647	0.1448	...	...	...	...	...	...
950	1,742	280.51	155.84	0.1640	0.1448	233.81	129.83	0.1298	0.1295	221.53	123.07
1,000	1,832	293.54	163.08	0.1630	0.1448	...	...	...	...	244.62	135.90
1,100	2,012	319.61	177.56	0.1614	0.1448	257.01	142.78	0.1298	0.1296	290.00	161.10
1,200	2,192	345.79	192.95	0.1600	0.1448	280.33	155.74	0.1298	0.1296	315.90	175.50
1,300	2,372	371.75	206.53	0.1589	0.1449	303.66	168.70	0.1298	0.1296	329.14	182.80
1,350	2,462	384.79	213.77	0.1584	0.1449	...	...	...	...	...	...
1,400	2,552	399.01	221.67	0.1578	0.1449	326.99	181.66	0.1298	0.1296	342.33	190.18
1,404.5	2,560	399.01	221.67	0.1578	0.1449	...	...	...	...	...	...
1,404.5	2,560	402.50	223.61	0.1592	0.2142	...	...	...	...	...	...
1,451	2,643.8	...	...	...	...	338.89	188.27	0.1298	0.1296	...	...
1,451	2,643.8	...	...	...	...	439.83	244.35	0.1684	0.1338	...	...
1,478	2,692.4	...	...	...	...	...	...	...	...	390.70	217.05
1,478	2,692.4	...	...	...	...	...	...	...	...	495.42	275.28
1,500	2,732	439.31	244.06	0.1627	0.2142	451.64	250.91	0.1673	0.1338	501.34	278.52
1,520	2,768	...	...	...	...	476.38	253.59	0.1668	0.1338	...	...
1,528	2,782.4	450.11	250.06	0.1637	0.2142	...	...	...	...	...	...
1,528	2,782.4	538.94	299.41	0.1595	0.1501	...	...	...	...	527.84	293.24
1,600	2,912	558.49	310.22	0.1939	0.1501	...	...	...	...	...	0.1833

increase varies with the nature of each material, and the thermal capacity of any material is the quantity of heat required to vary the temperature of unit mass of that material one degree from t to $t + 1$. The specific heat of the material is the ratio of its thermal capacity to that of pure water.

Certain solids change their physical forms when heated to certain temperatures, becoming liquid; these temperatures, also characteristic of each material, are called melting points, and the amount of heat necessary to cause the change of internal molecular equilibrium, without increase of temperature, is called heat of fusion. By adding further to the heat concentration, the temperature of the liquid rises to a second critical point, where gasification takes place; the liquid takes the form of a gas or a vapor. The temperatures characterizing these changes are called boiling points and the thermic energy absorbed, specific to the material, is called heat of vaporization.

These simple physical notions are known to practically all engineers, as they form the foundation of all industrial heat problems. Books dealing with the subject are filled with tables giving the results of numerous research investigations. Most of these tables concerning the commonly used metals date back to the early beginning of physical science, and are perpetu-

was not constant, for most materials, at all temperatures. This dependence necessitated further definitions, and that is the reason of the conception of mean spe-

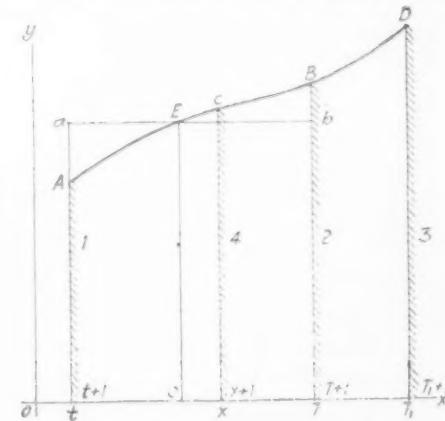


Fig. 1—Diagram to Illustrate Mean and Real Specific Heats

specific heat and real specific heat. This can be best explained by a graphic analysis. In Fig. 1, ox represents the temperature and oy the amount of heat. By

*Consulting engineer, New York.

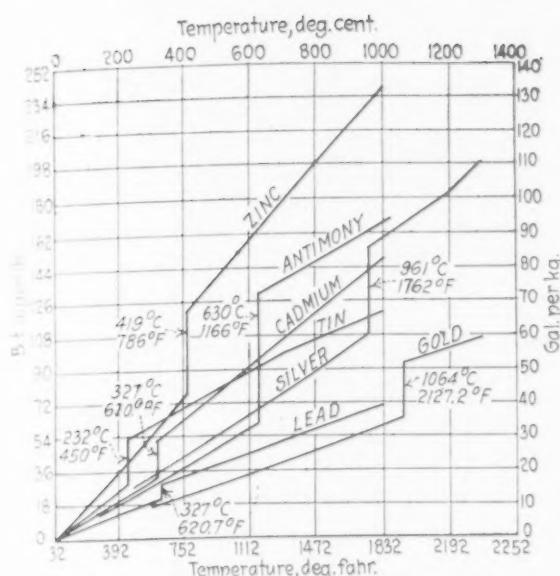


Fig. 2—Heat Content-Temperature Curves

successive determinations, with the help of a calorimeter, the curve $ACBD$ has been plotted. The amount of heat contained in the unit weight of a certain material between t and T is represented by the area $tACBDT, t$. The real specific heat at the temperature t is represented by the area (1); the real specific heat at the temperature T is (2); at any point X it is (4). The heat between t and T is represented by $tACBTt$.

To avoid planimetric complication or the integration of difficult formulas, it was found practical to

Table II. Comparison of Results Obtained on Iron by Different Investigators

Investigator	Material	Carbon, Per Cent	Heat of Fusion, Cal. per Kg.	Heat Content, Cal. per Kg.	Temperature, Deg. Cent.
Gruber	White pig iron	Not given	32 to 34	...	...
Wuest and Laval	Pig iron	3.4	...	277	1,220 [†]
Springorum	Pig iron	3.3	...	246	1,203
Schmidt	Steel	0.08	...	354	1,580
Gillhausen	White pig iron	4.35	59	...	...
Gillhausen	Hematite	4.3	...	278	1,220 [†]
Gillhausen	Thomas* pig iron	3.2	...	258	1,210 [†]
Wuest	pure iron	0.0	49.35	299.4	1,528
Meuthen & Duerr	pure iron	0.0	49.35	306.4	1,580

* Bessemer pig iron. [†] About.

assimilate the real area $tACBTt$ to a rectangle $taEbTt$ of the same surface, and the ordinate Ee was called mean specific heat between the temperatures t and T . It follows that, for all those substances whose specific heat is dependent upon the temperature, the two varieties of specific heats have to be considered, and consequently two tables will be required for complete information.

To avoid this complication, and to avoid in all calculations the multiplication $S(T-t)$, the writer has used in all his technical reports heat-content tables giving immediately the result of the above multiplication, without duplicate effort and source of error. The recognition of the multiple advantages of this practice was the reason for working up several data sheets along these lines for iron and aluminum; these were unfortunately very fractional, as no complete methodical investigations had been carried on along these lines.

Lately the writer's attention was drawn to the publication, by the German Engineers' Society, of the heat-content temperature curves of the industrially important metals, by Wuest, Meuthen and Duerr, in which the three authors have done this work with typical German thoroughness and the help of large scale laboratory equipment. The completeness of this research work and its scope are far beyond the effort of any individual, no matter how willing. The practical importance of the data is the reason for this article. The

writer makes no claim to originality, so far as the source of his information goes, but a rearrangement of the tables and their co-ordination, and condensation of the comment, was thought opportune. The linking up of the results with more general metalegraphic knowledge was also thought necessary.

Remarkable is the range of temperatures of the tests, from 0 deg. to 1000 deg. C. (1832 deg. Fahr.) for the low-melting metals and 0 deg. to 1500 or 1600 deg. C. (2732 or 2912 deg. Fahr.) for the others. New in every way are the specific heats of the metals in the

Table III. Heat Content-Temperature Relations for Manganese

Temperature Degrees Cent.	Temperature Degrees Fahr.	Heat Content B.t.u. per Lb.	Heat Content Cal. per Kg.	Specific Heat Mean 0° to T°	Specific Heat At T°
0	32	22.12	12.29	0.1229	0.1204
100	212	45.16	25.09	0.1255	0.1254
200	392				0.1305
300	572	69.07	38.37	0.1279	0.1356
400	752	93.98	52.21	0.1305	0.1407
500	932	119.75	66.53	0.1331	0.1458
600	1,112	146.46	81.37	0.1356	0.1509
700	1,292	174.08	96.71	0.1382	0.1559
800	1,472	202.61	112.56	0.1407	0.1610
900	1,652	232.11	128.95	0.1433	0.1661
1,000	1,832	262.40	145.78	0.1458	0.1712
1,050	1,922	277.92	154.40	0.1471	0.1737
1,070	1,958	284.11	157.89	0.1476	0.1747
1,130	2,066	346.68	192.60	0.1704	0.1770
1,200	2,192	369.00	204.99	0.1708	0.1770
1,210	2,210	372.17	206.76	0.1709	0.1770
1,230	2,246	445.26	247.37	0.2011	0.1980
1,250	2,282	452.39	251.33	0.2011	0.1980

Table IV. Heat Content-Temperature Relations for Antimony

Temperature Degrees Cent.	Temperature Degrees Fahr.	Heat Content B.t.u. per Lb.	Heat Content Cal. per Kg.	Specific Heat Mean 0° to T°	Specific Heat At T°
0	32	...	...	...	0.0521
100	212	9.39	5.21	0.0521	0.0527
200	392	18.86	10.48	0.0524	0.0533
300	572	28.46	15.81	0.0527	0.0539
400	752	38.16	21.20	0.0530	0.0545
500	932	47.97	26.65	0.0533	0.0551
600	1,112	57.87	32.15	0.0536	0.0557
630	1,166	60.88	33.82	0.0537	0.0559
630	1,166	130.82	72.68	0.1154	0.0546
700	1,292	137.73	76.52	0.1093	0.0550
800	1,472	147.69	82.05	0.1026	0.0556
900	1,652	157.77	87.65	0.0974	0.0562
1,000	1,832	167.94	93.30	0.0933	0.0568

molten state. The investigators used for all tests the purest forms of metals commercially available. The most outstanding feature, however, is the influence of allotropic modifications on the heat content-temperature curve, an effect that, while not unknown to the metallurgists, was absolutely ignored by others interested in the heat applications of the various metals.

For their tests the investigators used an apparatus

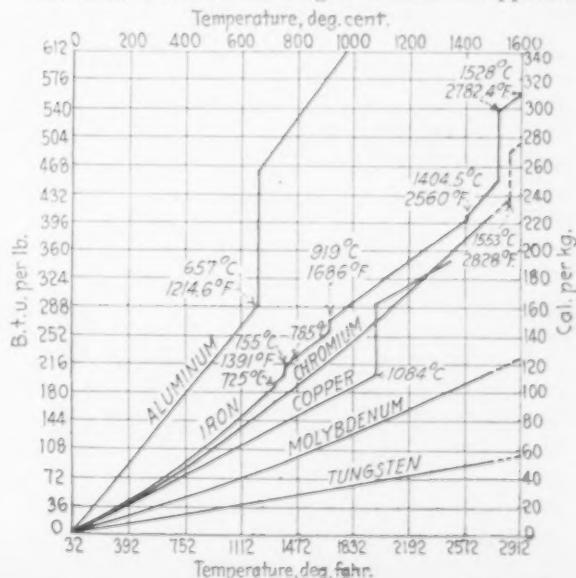


Fig. 3—The Iron Curve Is Shown to Have Nine Distinct Parts

Table V. Heat Content-Temperature Relations for Chromium, Molybdenum, Platinum and Tungsten

Temperature		Chromium				Molybdenum				Platinum				Tungsten			
Deg. Cent.	Deg. Fahr.	Heat Content per lb.	Specific Heat per kg.	Mean 0° to T°	At T°	Heat Content per lb.	Specific Heat per kg.	Mean 0° to T°	At T°	Heat Content per lb.	Specific Heat per kg.	Mean 0° to T°	At T°	Heat Content per lb.	Specific Heat per kg.	Mean 0° to T°	At T°
0	32	.....	.....	0.0555	.....	.....	.....	0.0359	.....	12.24	6.83	0.0683	0.0683	16.58	9.21	0.0921	0.0878
100	212	10.10	5.61	0.0561	0.0568	6.26	3.48	0.0348	0.0336	24.59	13.66	0.0683	0.0683	34.72	19.29	0.0965	0.0965
200	392	26.43	11.35	0.0568	0.0580	13.10	6.72	0.0336	0.0313	60.73	33.74	0.1125	0.0592	54.43	30.24	0.1008	0.1133
232	450	.....	.....	.....	.....	.....	.....	.....	.....	28.51	15.84	0.0683	0.0683	.....	.....	.....	.....
232	450	.....	.....	.....	.....	.....	.....	.....	.....	53.33	29.63	0.1277	0.0620	.....	.....	.....	.....
300	572	31.00	17.22	0.0574	0.0593	17.52	9.74	0.0325	0.0290	60.73	33.74	0.1125	0.0592	54.43	30.24	0.1008	0.1133
321	610	33.23	18.46	0.0575	0.0595	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
321	610	52.686	29.27	0.0912	0.0736	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
327	620.6	.....	.....	.....	.....	18.91	10.51	0.0322	0.0284	.....	.....	.....	.....	.....	.....	.....	.....
327	620.6	28.76	15.98	0.0489	0.0270	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
400	752	63.23	35.13	0.0878	0.0746	32.92	18.29	0.0457	0.0266	72.06	39.48	0.0987	0.0556	75.74	42.07	0.1052	0.1226
419	786	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	79.94	44.41	0.1060	0.1242
419	786	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	121.36	67.42	0.1609	0.1199
500	932	77.13	42.65	0.0853	0.0759	38.72	21.51	0.0430	0.0259	80.73	44.85	0.0897	0.0519	138.65	77.03	0.1541	0.1173
600	1,112	90.54	50.30	0.0838	0.0772	44.62	24.79	0.0413	0.0252	89.73	49.85	0.0831	0.0482	159.50	88.61	0.1477	0.1141
700	1,292	104.544	58.08	0.0830	0.0784	50.65	28.14	0.0402	0.0246	98.08	54.49	0.0793	0.0446	178.49	99.16	0.1427	0.1169
800	1,472	118.76	65.98	0.0825	0.0799	56.81	31.56	0.0394	0.0239	105.77	58.76	0.0735	0.0409	199.42	110.79	0.1385	0.1076
900	1,652	133.25	74.03	0.0823	0.0810	63.10	35.05	0.0389	0.0233	112.79	62.66	0.0696	0.0373	218.52	121.40	0.1349	0.1044
1,000	1,832	147.94	82.19	0.0822	0.0823	69.43	38.57	0.0386	0.0226	119.36	66.20	0.0662	0.0336	237.04	131.69	0.1317	0.1012

*These three lines figured, approximately, by author.

similar to the vacuum calorimeter of Oberhoffer, that is, a combination of an ice calorimeter with an electric vacuum furnace. For very high temperature, modifications were made to obtain a quick rise in temperature so as to avoid all side effects. For further details it will be necessary to refer to the above mentioned source, which has also a most complete and up-to-date compilation of the literature on the subject.

All tables give the results in the calorie-Centigrade system, and the corresponding results in the B.t.u.-Fahrenheit system. They indicate for the given temperatures the heat content, the mean specific heat from 0 deg. to T, and the real specific heat at T. The calorie columns were taken from the various pages of the above-mentioned source; the others were figured by the writer. For the change of units, 1 kg.-calorie per kilogram of material was assumed equivalent to 1.8 B.t.u. per lb.; or 1 B.t.u. per lb., the same as 0.555 kg. cal. per kg.; in other words, in the ratio of the temperature scales (1 large calorie or kilogram calorie equals 3.968 B.t.u., or 1 B.t.u. equals 0.252 kg. cal.). The curves are plotted with the temperatures as abscissæ and the amounts of heat as ordinates. Both unit systems are given.

Information concerning iron is most important, and Figs. 3 and 5 as well as Tables I and II deal with this most useful metal. For the tests an electrolytic iron was secured with practically no impurity, even the gases having been purged out by a special process. It was found that the heat content temperature curve

was made up of nine distinct parts. From 0 deg. C. to 725 deg. C. (1337 deg. Fahr.) there was an uninterrupted slightly parabolic line, corresponding to the crystallization of the metal. After that temperature a somewhat steeper branch ran from 725 deg. C. to 785 deg. C. (1445 deg. Fahr.) during which a change in the molecular structure took place; this corresponds to the gradual formation of the β variety of iron, stable at those higher temperatures. After 785 deg. C. practically a straight line occurred, until at 919 deg. C. (1686 deg. Fahr.) a pretty nearly definite decalcescence point was characterized by a heat jump of 6.64 cal. per kg. (11.95 B. t. u. per lb.). This indicates the recrystallization of the mass into the α variety.

From 919 deg. C., the fifth part of the curve is practically straight, with no disturbance until 1404.5 deg. C. (2560 deg. Fahr.), at which temperature a third critical point is noticed very clearly by a sudden heat absorption of 1.94 cal. per kg. (3.5 B. t. u. per lb.). At this temperature another allotropic change takes place, a new resetting of molecular forces, which is called the δ variety of iron. From 1404.5 deg. C. the diagram continues as a straight line up to 1528 deg. C. (2782.4 deg. Fahr.), where the melting phenomena take place, accompanied by the large absorption of 49.35 cal. per kg. (88.83 B. t. u. per lb.) without increase in temperature. This quantity represents the heat of fusion, which is in fact only a sudden increase in the specific heat. After all molecules have found

Table VI. Heat Content-Temperature Relations for Cadmium, Lead, Tin and Zinc

Temperature		Cadmium				Lead				Tin				Zinc			
Deg. Cent.	Deg. Fahr.	Heat Content per lb.	Specific Heat per kg.	Mean 0° to T°	At T°	Heat Content per lb.	Specific Heat per kg.	Mean 0° to T°	At T°	Heat Content per lb.	Specific Heat per kg.	Mean 0° to T°	At T°	Heat Content per lb.	Specific Heat per kg.	Mean 0° to T°	At T°
0	32	.....	.....	0.0555	.....	.....	.....	0.0359	.....	12.24	6.83	0.0683	0.0683	16.58	9.21	0.0921	0.0878
100	212	10.10	5.61	0.0561	0.0568	6.26	3.48	0.0348	0.0336	24.59	13.66	0.0683	0.0683	34.72	19.29	0.0965	0.0965
200	392	26.43	11.35	0.0568	0.0580	13.10	6.72	0.0336	0.0313	60.73	33.74	0.1125	0.0592	54.43	30.24	0.1008	0.1133
232	450	.....	.....	.....	.....	.....	.....	.....	.....	28.51	15.84	0.0683	0.0683	.....	.....	.....	.....
232	450	.....	.....	.....	.....	.....	.....	.....	.....	53.33	29.63	0.1277	0.0620	.....	.....	.....	.....
300	572	31.00	17.22	0.0574	0.0593	17.52	9.74	0.0325	0.0290	60.73	33.74	0.1125	0.0592	54.43	30.24	0.1008	0.1133
321	610	33.23	18.46	0.0575	0.0595	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
321	610	52.686	29.27	0.0912	0.0736	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
327	620.6	.....	.....	.....	.....	18.91	10.51	0.0322	0.0284	.....	.....	.....	.....	.....	.....	.....	.....
327	620.6	28.76	15.98	0.0489	0.0270	32.92	18.29	0.0457	0.0266	72.06	39.48	0.0987	0.0556	75.74	42.07	0.1052	0.1226
400	752	63.23	35.13	0.0878	0.0746	.....	.....	.....	.....	72.06	39.48	0.0987	0.0556	79.94	44.41	0.1060	0.1242
419	786	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	121.36	67.42	0.1609	0.1199
500	932	77.13	42.65	0.0853	0.0759	38.72	21.51	0.0430	0.0259	80.73	44.85	0.0897	0.0519	138.65	77.03	0.1541	0.1173
600	1,112	90.54	50.30	0.0838	0.0772	44.62	24.79	0.0413	0.0252	89.73	49.85	0.0831	0.0482	159.50	88.61	0.1477	0.1141
700	1,292	104.544	58.08	0.0830	0.0784	50.65	28.14	0.0402	0.0246	98.08	54.49	0.0793	0.0446	178.49	99.16	0.1427	0.1169
800	1,472	118.76	65.98	0.0825	0.0799	56.81	31.56	0.0394	0.0239	105.77	58.76	0.0735	0.0409	199.42	110.79	0.1385	0.1076
900	1,652	133.25	74.03	0.0823	0.0810	63.10	35.05	0.0389	0.0233	112.79	62.66	0.0696	0.0373	218.52	121.40	0.1349	0.1044
1,000	1,832	147.94	82.19	0.0822	0.0823	69.43	38.57	0.0386	0.0226	119.36	66.20	0.0662	0.0336	237.04	131.69	0.1317	0.1012

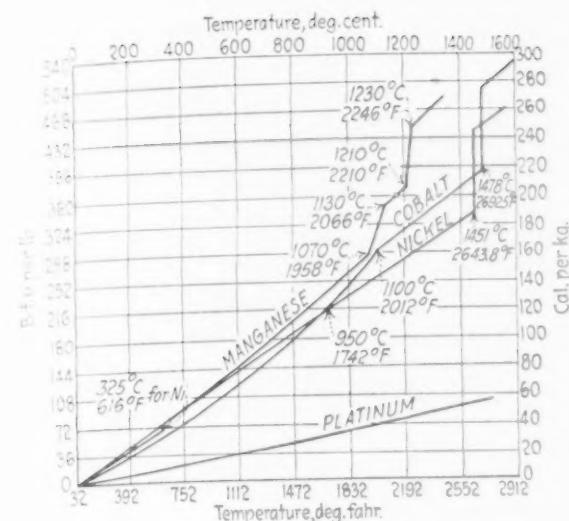


Fig. 4.—Heat Content-Temperature Curves

their new balance, the curve indicates a steady increasing line showing the conditions of the superheated molten metal.

These results indicate that the specific heats not

compilation of all experimental results of the literature on the subject, which shows that, in spite of the differences, the above data are very acceptable for industrial purposes. The recognition of the heat variations at the so-called critical points has up to now been the monopoly of the metallographer of the specialist—and this knowledge has hardly diffused beyond this narrow circle.

It is useless to emphasize the practical importance and great value of a better understanding of the interrelation of the thermic and crystallographic phenomena, and a generalization of this remarkable knowledge is imperative. The newly developed industry of alloys, with its enormous possibilities, and the interesting and efficient application of electric heating, will require a thorough knowledge of these data. Recently developed heat-treating methods, like the hump method of Leeds & Northrup, are only the logical application of the result of this science in a practical, foolproof form. In fact, it may be stated, without exaggeration or error, that all irregularities in the pyrometer-time curves, without reason from outside, are due to variation of the specific heat in correlation with internal changes within the mass of the metal.

Manganese, nickel and cobalt are dealt with on Fig. 4 and in Tables I and III. These three metals are closely related to iron, and present also irregularities in their heat content-temperature curves indicating

Table VII. Heat-Content-Temperature Relations for Aluminum, Copper, Gold and Silver

Temperature	Aluminum			Copper			Gold			Silver			
	Heat Content	Specific Heat		Heat Content	Specific Heat		Heat Content	Specific Heat		Heat Content	Specific Heat		
Deg. Cent.	Deg. Fahr.	B.t.u. per lb. per kg.	Cal. 0° to T°	Mean At	B.t.u. per lb. per kg.	Cal. 0° to T°	Mean At	B.t.u. per lb. per kg.	Cal. 0° to T°	Mean At	B.t.u. per lb. per kg.	Cal. 0° to T°	Mean At
0	32	40.66	22.59	0.229	18.20	10.11	0.1011	10.088	5.72	3.18	0.0318	0.0320	0.0573
100	212	82.69	45.94	0.2297	36.51	20.28	0.1014	10.020	11.50	6.39	0.0320	0.0322	0.0583
200	392	126.12	70.07	0.2336	54.92	30.51	0.1017	10.1026	16.85	9.36	0.0321	0.0325	0.0605
300	572	170.95	94.97	0.2374	73.44	40.80	0.1020	10.032	23.20	12.89	0.0322	0.0328	0.0616
400	752	217.15	120.64	0.2413	92.09	51.16	0.1023	10.1038	29.12	16.18	0.0324	0.0330	0.0627
500	932	264.76	147.09	0.2452	10.74	61.57	0.1026	10.1045	35.08	19.49	0.0325	0.0333	0.0638
600	1,112	292.50	162.50	0.2473	148.64	82.58	0.1032	10.057	47.36	26.20	0.0328	0.0338	0.0650
657	1,214.6	345.14	0.3451	0.2667	167.72	93.18	0.1035	10.1063	53.26	29.59	0.0329	0.0341	0.0660
700	1,292	481.09	267.27	0.3818	129.69	72.05	0.1029	10.051	41.09	22.83	0.0326	0.0335	0.0649
800	1,472	526.93	292.74	0.3659	148.64	82.58	0.1032	10.057	88.76	49.31	0.0616	0.0660	0.0650
900	1,652	573.66	318.70	0.3541	167.72	93.18	0.1035	10.1063	100.73	55.96	0.0622	0.0670	0.0670
961	1,762	.....	.....	.....	.....	.....	.....	.....	.....	108.14	60.08	0.0625	0.0678
961	1,762	621.26	345.14	0.3451	186.91	103.84	0.1038	0.1069	60.02	33.01	0.0330	0.0343	0.0615
1,000	1,832	.....	.....	.....	.....	.....	.....	.....	.....	159.37	88.54	0.0885	0.0637
1,050	1,922	.....	.....	.....	.....	.....	.....	.....	62.51	34.73	0.0331	0.0344	.....
1,061	1,947.2	.....	.....	.....	.....	.....	.....	.....	63.38	35.21	0.0331	0.0345	.....
1,061	1,947.2	.....	.....	.....	.....	.....	.....	.....	91.94	51.08	0.0480	0.0323	.....
1,081	1,983	.....	.....	.....	203.11	112.84	0.1041	0.1074	.....	.....	.....	.....	.....
1,084	1,983	.....	.....	.....	294.94	163.81	0.1511	0.1007	94.05	52.25	0.0475	0.0329	171.34
1,100	2,012	295.99	164.44	0.1495	10.28	10.28	0.1159	0.1159	100.13	55.63	0.0464	0.0346	182.34
1,200	2,192	315.68	175.38	0.1462	10.28	10.28	0.1159	0.1159	107.50	59.17	0.0455	0.0364	198.34
1,300	2,372	337.72	187.62	0.1443	10.28	10.28	0.1291	0.1291	.....	.....	.....	.....	110.19

only vary with temperatures, but are also subject to irregularities pertaining to allotropic changes within the mass of the metal. While the few theories on the mechanism of these recrystallizations and their balance are still very conflicting, the practical thermic effect is undeniable, and has to be accepted at full face value. It must be stated that the first caloric disturbance, around 725 deg. C. (1337 deg. Fahr.), is accompanied by the loss of the magnetic qualities of the metal.

Similar curves are not available for the industrial forms of iron, such as soft steel containing 0.1, 0.2, 0.5, etc. per cent of carbon. It is undeniable that such investigations would be of enormous benefit to industry, but the metallographic researches have given us the well known Roberts-Austen diagram of Fig. 5, which, used in conjunction with the heat content-temperature curve, will prove of great value. Instead of the various allotropic changes of iron, the well known forms of iron carbon combinations and solutions have to find their internal balance and relative solubility, one in the other. The phenomena change very little in their nature, but the critical temperatures vary according to the lines given in the diagram.

National research laboratories have here a great opportunity to earn, besides scientific reputation, the thankfulness of the whole technical world by carrying out similar investigations. Table II is a comparative

allotropic transformations and recrystallizations; some of them are sudden and clearly defined, others are gradual and progressive. Nickel has a perturbation

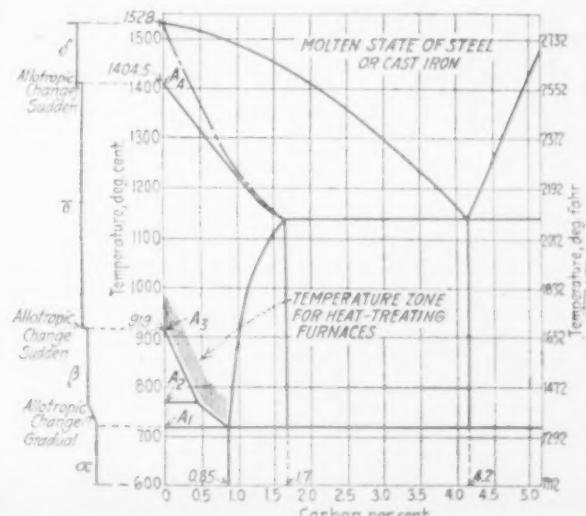


Fig. 5.—The Roberts-Austen Diagram

at 325 deg. C. (about 615 deg. Fahr.) accompanied by the loss of magnetic properties. Manganese has, besides, a gradual modification at about 1100 deg. C. (2000 deg. Fahr.)—the peculiarity of melting within a range of temperatures, rather than at a definite melting point.

Chromium, molybdenum and tungsten are shown on Fig. 3 and platinum on Fig. 4; and the results are compiled in Table V. These metals do not show any disturbances in their diagrams. Chromium has been investigated up to only 1500 deg. C. (2732 deg. Fahr.); the dotted continuation is approximated, and the three last lines of its table are not absolutely correct.

Table VIII. Condensed Sequence of Melting Points and Fusion Points of Metals

Metal	Temperature of Fusion		Heat of Fusion		Temp'ture of Vaporization	
	Deg. Cent.	Deg. Fahr.	Cal. per Kg.	B.t.u. per Lb.	Deg. Cent.	Deg. Fahr.
Tin	232	450	13.80	24.80	2,270	4,118
Bismuth	270	518	10.32	18.57	1,120	2,588
Cadmium	321	610	10.81	19.47	778	1,432
Lead	327	620.6	5.47	9.85	1,550	2,822
Zinc	419	786	23.01	41.42	920	1,688
Antimony	630	1,166	38.86	69.95	1,440	2,624
Aluminum	657	1,214.6	93.96	169.12	1,800	3,272
Silver	961	1,762	26.00	46.80	1,955	3,551
Gold	1,064	1,927	15.87	28.56	2,200	3,992
Copper	1,084	1,983	50.97	91.75	2,310	4,190
Manganese	1,220	2,228	36.63	65.93	...	...
Nickel	1,451	2,644	56.08	101.92	...	...
Cobalt	1,478	2,692	58.23	105.71	...	...
Iron	1,528	2,782	49.35	88.83	...	...
Chromium	1,553	2,828	32.00	58.60	...	...
Platinum	1,750	3,182	27.18	48.92	...	...

The results of the investigation of the low-temperature melting metals are given on Figs. 2 and 3, and Tables IV, VI and VII contain the compiled data. No changes take place and all the diagrams are made up of three links only, due to the melting phenomena. Worth mentioning is the large heat capacity of aluminum, the light density metal.

Table VIII condenses in order the melting points of the metals investigated and the corresponding heats of fusion. Added are several boiling points at atmospheric pressure. These were determined by special tests, as the circumstances of the previous research, in inclosed quartz tubes under vacuum, did not allow these phenomena to interfere with the results. That is why, for certain metals, the curves do not show a disturbance, in spite of temperatures higher than the boiling points.

Bonuses Given to Dismissed Employees

How one of the leading shipbuilding companies in Japan successfully reduced the number of its workers by about one-fifth without labor difficulties is explained in a recent report of Vice-Consul Irvin C. Carrell at Nagasaki. The number of employees at the beginning of this year was in excess of the number needed for the building program. In February the company announced that in addition to the usual bonus given Japanese workmen upon resignation or dismissal, employees tendering their resignations within 10 days would be given a special bonus in addition, of cash amounting to 60 to 120 days extra pay and traveling expenses for themselves and families back to the workman's native city. The scale was worked out as follows: For 1 year's service 10 days pay, and 10 days additional for each year of service up to 5 years. For 10 years of service 150 days pay were given and this scale ranged up to 1520 days pay for 40 years of service.

The Youngstown Steel Co., Youngstown, Ohio, has awarded contracts for one 1200 hp. motor and one 1500 hp. motor to the Westinghouse Electric & Mfg. Co., Pittsburgh. The equipment is to be used in the mechanical puddling plant being erected by the company at Warren, Ohio.

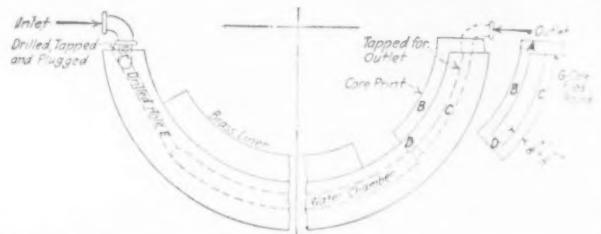
Improved Casting for Mill Journals

BY M. E. DUGGAN

It is not uncommon to have to renew mill roll journal boxes within twenty-four hours after installation. I have seen two boxes taken out and replaced in a 10-hr. run.

The large amount of machine labor involved in preparing one of these water-cooled boxes for use can be materially reduced by using a core, as shown in the illustration, in place of the usual machining operation.

The drawing shows a standard mill roll water-cooled journal box with inlet and outlet at the top. The left-hand or inlet side shows the usual machining operation; the right-hand side shows the core arrange-



Drilled, Tapped and Plugged Outlet on Left; Simpler Cored Outlet at Right

ment suggested by the writer. Ordinarily a $\frac{3}{4}$ -in. hole is drilled into the water chamber—a distance of 5 to 8 in.—as shown at F, and plugged at the top. A hole is then drilled and tapped square with the top face and a little to the side of the hole F, connecting it with the inlet.

On the right-hand side, A B is the core print, C is the cored outlet port and D is a cored hole through the casting providing a support for the core, which is shown separately. Dimensions are as shown with the square section filed round at G so that the port can be drilled and tapped to receive the outlet fitting—a much simpler operation than its alternative.

Mechanical Working of Invar

Invar steel is very difficult to work mechanically but is an important alloy for certain classes of work where very low coefficient of expansion is desired. In order to see whether it could not be worked successfully, four small ingots of invar were prepared by the metallurgical division of the Bureau of Standards. The first attempt at forging was unsuccessful, the ingot cracking and breaking under the forging press. The second attempt was quite satisfactory as a result of very careful handling during forging operations.

It was found necessary to give very light reductions and not allow the forging temperature to drop below 1000 deg. C during the first reduction. This ingot was forged to a $\frac{3}{8}$ -in. rod, and a portion of this was cut off and machined to a $\frac{1}{4}$ -in. rod. This has been cold drawn with two intermediate annealings down to approximately $1/16$ -in. wire. It is being carried further with the idea of determining how fine a wire of invar may be made.

Number Wood Screw Sizes Reduced

On June 20, a second conference of wood screw manufacturers was held at the Bureau of Standards. Twelve of the largest wood screw manufacturers were represented. A new list of standard sizes was adopted which reduces the sizes of both steel and brass screws from 555 to 291, a reduction of 47 per cent. The previous standards for tolerance in lengths of round head screws were revised.

Specifications for wood screws have been written as an outcome of the above conference and are now under consideration by the hardware committee of the Federal Specifications Board. It is expected that these specifications will be published shortly as a Government standard.

Government Takes Decisive Action

Plans to Prevent Distress Due to Railroad and Coal Strikes Are Adopted After Washington Conference

WASHINGTON, July 25.—The iron and steel and allied industries of the United States are expected to suffer severely from the rigid plans adopted by the Government to meet the acute situation growing out of the railroad and coal strikes. Effective at 12 o'clock tonight, orders issued this afternoon by the Interstate Commerce Commission establish a priority list for the dispatch of traffic to be observed by all railroads East of the Mississippi in respect to essential consumers. Iron and steel and allied industries not being so classified, they will take the lowest grade with reference to shipments of their products and receipt of coal.

Fitting in with this plan of the commission is one adopted as the result of a conference yesterday between Secretary of Commerce Hoover, representatives of railroads and coal operators providing for the distribution of current coal production and for prevention of unfair prices. This latter plan, to be reported back to coal operators, is expected to be put in operation within 36 hours.

Plans Outlined

The plans outlined are so sweeping in their character that cars may be assigned as directed by the commission, and coal obtained for consumers on the preference and priority list. Moreover, private cars may be commandeered and likewise coal from private mines may be taken for the purpose of supplying the consumers given priority and preference, if necessity demands it. The priority and preference list is as follows: Food for human consumption, feed for livestock, livestock, perishable products, coal, coke and fuel oil. It is intended that fuel be given preferential movement to the consumers on the priority list in the following preferred order: Railroads, bunkering for ships, public utilities directly serving the general public, electric power and light, gas, water and sewer works, ice plants, hospitals, Federal, State, county and municipal governments and their hospitals, schools, and other public institutions.

Priority List Created

In the creation of the priority list for the distribution of coal, the Interstate Commerce Commission said that in the supply of cars to mines upon the lines of any coal-loading carrier the railroad should observe the preference and priorities established in five classes as follows: For such special purposes as may from time to time be designated by the commission, the list previously mentioned, beginning with fuel for railroads, coal for trans-shipment by water from Lake Erie ports to Lake Superior ports to care for the needs of the Northwest, this covering coal from mines in Pennsylvania, Ohio, West Virginia, Kentucky, Tennessee and Alabama, commercial sizes of coal for domestic use. Lastly comes the classification "All other purposes," which includes, while not specified, among others, iron and steel and allied industries. The latter will be required to wait for coal until after the so-called essential consumers have been supplied.

Car Service Orders

The car service orders of the commission were issued upon its declaration of a national emergency, and the railroads of the country east of the Mississippi were accordingly placed upon a footing that in many respects is as serious as in a time of war.

Traffic is to be moved by the most available routes designed to expedite shipments and prevent congestion regardless of the routing that may be ordered by shippers or the ownership of the cars. The declaration of an emergency was made in one order, while another established the preferences and priorities. The wording is somewhat different from that of the car service order of May 20, 1920, and is phrased so as to avoid, if possible, controversies which followed the issuance of the order of 1920. The priority order provides that in the event carriers east of the Mississippi River are not able to transport all the tonnage offered to them within a reasonable time, they are to put aside the traffic of industries other than those engaged in the production of food and foodstuffs, livestock, perishable products, coal, coke and fuel oil. Coke ovens operating under this condition can be compelled by means of the distribution of cars to make shipments where directed. Iron and steel and other shipments can be withheld if cars are required for so-called essential purposes.

Directions to Railroads

The commission directed all railroads to place an embargo on the receipt of coal or other freight transported in open top cars suitable for coal loading and against the placement of such open top cars when any consignee fails to unload the coal or other freight within 24 hours after cars are placed. This is not to interfere with the movement of coal to tidewater or to the Great Lakes for trans-shipments by water. No coal included in any of the special classes is subject to reconsignment or diversion, except for some purpose in the same or superior class in the priority prescribed. Railroads are divided into coal loading and non-coal loading classes and orders are specified for their operation east of the Mississippi River, although the order affects all railroads of the country where the occasion may require it. A machine for the administration of the car orders will be set up by the commission.

The Hoover Plan

The organization being set up through the Hoover plan is distinct. It provides for a committee in Washington, to be appointed by the President, of representatives of the Department of Commerce, the Interstate Commerce Commission, the Department of Justice, and the Department of Interior, to be designated by the presidential committee. It will have general supervision of the measures adopted. Next will be an administrative committee, comprising representatives of the presidential committee, together with representatives of coal operators, and railroads, and where necessary of the larger consuming groups. The presidential committee will establish a representative in each coal producing district and appoint a committee of operators in each district to be nominated by the district operators' association or independent operators. In case of failure of the operators to take such action, the presidential committee may appoint such operators as it sees fit on such committee. The presidential committee will co-operate with the Interstate Commerce Commission in carrying out preferential orders to be issued by the commission. Governmental representatives in the districts in co-operation with the district committee will advise the commission as to the local car movement, and operators will proceed with their usual business until they are affected by preference

orders. It is expected that the district committees under the authority of the presidential committee will recommend allotment of cars on the basis of those who conform to the fair prices to be agreed upon with the presidential committee, the purpose being to give preference in car supply to mines living up to the price agreed upon with Secretary Hoover. Railroads will be asked to appoint a representative to deal with purchases of railroad fuel.

Should coal be moved at once to the preferred classes, it is estimated that it would take practically all of the present output, which is said to be at the rate of 4,000,000 tons this week, leaving other industries to depend entirely upon their stocks. Moreover the contracts the latter have had for coal can be abrogated, if necessary.

Further Reduction in Coal Output

WASHINGTON, July 25.—Further sharp restriction of coal production is reported by the Geological Survey, which says that the week of July 17-22 may set a new low record since the strike began. Reports indicate that output cannot exceed 3,600,000 tons, against a minimum of 3,575,000 tons in the third week of the strike and a maximum of 5,363,000 tons in the twelfth week. The chief factor in the continued curtailment is the railroad shopmen's strike. Practically no anthracite coal is being mined. At the present rate of production, it is from 5,000,000 to 6,000,000 tons weekly below normal. There was a gradual daily decline of car loadings during the sixteenth week of the strike, going down from 12,657 cars on Monday to 10,800 on Thursday, the latest day of the Geological Survey record. The cause of the decrease was traffic congestion on railroads serving the non-union fields. In the southern West Virginia and Eastern Kentucky from which the bulk of the country's supply during the strike has come, almost every field reported acute transportation disability. In Virginia, western Kentucky and Tennessee the interruption of car supply was less serious and in Alabama and the Far West increased. No important change in the number of men at work during the sixteenth week took place. Production in non-union Pennsylvania during the first half of the week showed a slight decrease from the week preceding.

The total number of unbilled cars at the mines on July 15 was only 2,405 of which 621 were at anthracite mines. For a group of 22 of the largest carriers, holding about 75 per cent of the total number of unbilled loads, there were only 1079 cars.

Developments in Connellsville Region

UNIONTOWN, PA., July 22.—Railroad and coal strikes are cutting into the fuel production and business conditions generally in the Connellsville bituminous region. Coal production is being affected more seriously now by the railroad strike than by the sympathetic strike of the coal miners who have affiliated with the United Mine Workers. Additional miners daily are being brought into the Connellsville region and operators are attempting to increase their production. The H. C. Frick Coke Co. has advanced its output to around 35 per cent of normal, but operating independent plants have not reached this proportion. W. J. Rainey, Inc., posted notices this week that its plants would resume in accordance with the President's invitations to operators. The Rainey notices read:

The President of the United States has ordered all mines to start at once and will furnish complete protection. The Government expects you to return to work immediately or your places will be filled by others.

So far there has been no response to these notices. None was expected, however, until around the first of the week and the situation at the Rainey plants is largely one of watchful waiting. Four of the six Rainey plants have been idle since April 1. It is understood that some of the other companies in the region are considering posting similar notices.

An attempt was made this week to blow up the

tipple at Lemont mine of the H. C. Frick Coke Co. A heavy charge of dynamite was exploded about 200 ft. from the tipple, but aside from tearing a hole in the ground, did no damage. When a suspicious person was seen near the Dearth tipple of the Frick company, guards ordered him to stop. He ran and they fired at him. A fusillade of some 75 to 100 shots fired from the hillside overlooking the plant followed, presumably by strikers in tent colonies on the hill. The home of a guard at Hopwood was destroyed by fire during absence of the family, incendiaryism being charged. Two coal trains, one on the Smithfield branch of the Baltimore & Ohio and the other on the M. R. R. Railroad were wrecked last night. It is declared that switches had been tampered with. One brakeman was injured.

The coroner's jury investigating the recent tipple killing of three strikers at the New Geneva plant of the Atlantic Coal Co. disagreed as to Leroy S. Lincoln, chief deputy. Two other deputies were exonerated. Lincoln was later held under \$15,000 bail for the grand jury on three charges of voluntary manslaughter. Two members of the coroner's jury were members of the United Mine Workers. The vote is said to have been five to one for exonerating Lincoln. It is the first time in the history of the county that a coroner's jury has failed to agree.

GERMAN MACHINE-TOOL MEETING

Manufacturers Discuss the Effects of Adverse Price Situation—Unable to Compete in Many Markets

The serious effect of the present price level on export trade was discussed at the annual meeting in Berlin of the Association of German Machine Tool Manufacturers, says a report from Commercial Attaché Herring at Berlin. The association, it is stated, includes 700 plants employing 125,000 workers. Although in the closing months of 1921 the industry experienced a boom, it was asserted at the meeting that world market prices have recently been reached and even exceeded in certain lines, resulting in a decline of 80 per cent in export orders since Jan. 1 of this year.

The difficulties which an improvement of the market would occasion, since labor costs could not be immediately reduced without serious controversy, were dwelt upon and the present difficulties of obtaining a regular and adequate supply of materials, particularly coal, was emphasized. Complaint was made of the lack of skilled labor. The shifting price system (gleitende Preise) was recognized as necessary under present conditions, and invoicing of export sales in foreign currencies was recommended. The foreign-trade control by the Aussenhandelsstelle of the machine-tool industry was commended, having resulted, it was said, in preventing exchange dumping abroad.

Exports of machine tools to Italy, Switzerland, France, Belgium and Spain, it was pointed out, have virtually ceased, since price competition in these countries on a c.i.f. duty paid basis is no longer possible.

Two pamphlets have recently been issued by the Electric Furnace Construction Co., Philadelphia. One describes the electro steam generator and the other the latest developments and improvements in the Greaves-Etchells electric melting and refining furnaces. Particular mention is made of the recent improvements which make it possible for all of the electric current to be put either entirely through the top electrodes or, by change of position of the switch, through the whole of the furnace hearth. Other specialties are discussed.

The Hydraulic Society has issued a second edition of its pamphlet entitled, "Trade Standards in the Pump Industry." Additional tables and explanatory data have been added to this compilation of standards of manufacture and engineering practice in the pump industry. There is also a revised list of members of the society. Copies of the pamphlet may be secured from the secretary, C. H. Rohrbach, 50 Church Street, New York.

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ESTABLISHED 1855

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A. I. FINDLEY

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The Steel Merger Decisions

For many years big business has been groping in the dark because it has not known its rights. Beginning with the days of President Roosevelt, there was strong sentiment, which had much justification, against large combinations of companies, and this feeling reached its climax under the Taft administration with the filing of the dissolution suit against the United States Steel Corporation and continued under President Wilson until war came. As one prominent ore man expressed it: "Men of the same line of products can hardly meet on the street for a friendly conversation without placing themselves under suspicion of getting together in wicked alliance to fix prices." When war came, all was changed. As another industrial leader said: "Nowadays we are invited by the Government to violate the law." In other words, manufacturers were urgently requested to unite in regulation of both production and distribution of their products. And they did.

After the signing of the armistice, business was again surrounded by clouds of uncertainty. No one knew what the policies of the Wilson administration would be and there was little if any clearing of the skies after Warren G. Harding entered the White House. Many times, under the various administrations, it had been urged that business be provided some chart to guide it and that organizers of proposed mergers be told whether or not they were proceeding illegally. Generally the answer given was, in substance, that if the Government believed that the Sherman act or the Clayton act was being violated it would be heard from. Perhaps there would have been no departure from this policy of acting only after the fact, had not Senator La Follette forced the hand of the Department of Justice with his ranting resolution alleging an intended monopoly in the steel industry.

In responding to the Senate resolution, which to one type of public men would have been a not unwelcome invitation to corporation baiting, the Attorney-General has acted with courage seldom seen in public officials. He declares that the two proposed mergers of independent companies—one of Bethlehem and Lackawanna and the other of Midvale, Republic and Inland companies—are not

in contravention of the Sherman, the Clayton or the Webb law. There is no evasion, no mincing of words. As to the former, the Attorney General emphatically says:

I am persuaded that the motive which prompts the Bethlehem to acquire the Lackawanna plant is the sole desire to secure greater efficiency and economy in the production, handling, and distribution of steel products, and that the thought of acquiring a monopoly or of enhancing prices was never present. The whole transaction from beginning to end impresses me as being thoroughly clean, honest and straightforward.

As to the Midvale-Republic-Inland merger, the Attorney-General says in concluding his review of the proposal:

Instead of being in restraint of trade, the new combination will be in furtherance of trade. Its formation has, I believe, been prompted in a great measure by the heavy losses which all of these companies sustained following the marked depression in the steel industry which began over a year ago. These losses, aggregating many millions of dollars, have naturally induced these companies to devise methods of cheapening the production, sale and distribution of their products. By owning plants that are widely scattered, where production can take place in accordance with the needs of the community lying closest to the plants; by manufacturing products at plants advantageously located to ore supplies; by reducing overhead expenses; and by eliminating unnecessary sales agencies, substantial economies can be effected. The combination being formed for this sole purpose, I am unable to see wherein it is tainted with illegality.

It is significant that the Attorney-General stresses what has appealed to steel manufacturers in the trying readjustments following the collapse of 1920 as the way out of their serious situation. There must be a cheapening of production and distribution. In a day of high transportation cost there must be ownership of plants in various districts, so that long hauls may be eliminated. Overhead must be cut down and output increased to produce the largest possible divisor into a lessened aggregate of fixed charges.

Seeing that the opinion just given was in response to a call of the Senate, it does not follow that the Department of Justice has established a policy of advising corporations definitely what they may or may not do without fear of prosecution. But a door has been opened that is not likely again to be completely shut. The Midvale-Worth-Cambria merger of war time went without

protest from Washington; likewise the acquisition of the Pennsylvania and Maryland companies by Bethlehem. Later came the Wheeling, La Belle and Whitaker-Glessner merger and the acquisition of the Ashland Iron & Mining Co. by the American Rolling Mill Co. But none of these or of the several minor consolidations of recent months met the challenge of a La Follette resolution.

The steel trade is not likely to conclude that the Attorney-General's findings as just announced give warrant for the indiscriminate forming of combinations, and it will not need to be reminded that the policy of to-day cannot determine with certainty that of to-morrow. Even the Supreme Court has made rulings that were tantamount to a reversal of itself. But there will be the satisfaction in connection with the opinion the Department of Justice has just given, that the "rule of reason" laid down in the Standard Oil case in 1911 is being practically applied and that furtherance of trade rather than restraint of trade may result from consolidation under the conditions now existing in the steel industry.

Better Sands for the Foundry

Not the least of the more recent developments in the foundry industry are those in molding sand research. For the first time in the history of the American Foundrymen's Association a special session was devoted to this subject at the annual convention in June. Too little attention has been paid to scientific study in this field; yet a vast deal depends on the composition and physical properties of molding sand, particularly in steel foundry practice. Temperatures are high there, and the chances of chemical reactions in the sand or between the sand and metal are many. It has been too long the custom to judge a sand by its appearance, by its action when handled, or by other untrustworthy tests. Scant investigation has been made of the chemistry required to meet temperature and other conditions.

The research now under way has had good results. More is being done in combining sands of various compositions to attain proper mixtures for diverse foundry conditions. It has been brought out that sands have been discovered which will not fuse at 3200 deg. Fahr. Mixtures which rightly may be called synthetic sands are also a possible development, and their use should mean better castings. As in the refractory industry, so with sand, the value of a knowledge of chemistry is being more thoroughly recognized.

Despite the slow recovery in the output of steel in Great Britain, exports are large and expanding. The May shipments of steel and iron from the country, 300,981 gross tons, were second only to those of March, and bring the monthly average for 1922 to 275,300 tons, or almost on a par with the 1920 rate. Over 50 per cent of the exports to June, this year, are made up of pig iron, rails, tin plate and galvanized sheets, with the latter predominating. An examination of the steel output, however, presents a singular contrast. For the first half of this year the monthly average

was only 427,100 tons, with the June output next to the lowest for the year. In 1920 British steel furnaces made 755,600 tons per month. The rate this year is, therefore, only 56.5 per cent of the 1920 rate, while the exports to June 1 have been almost the same as in that year. The conclusion is natural that domestic demand is abnormally low.

The Relation of Scrap Prices

The theory held in many quarters that the coal strike would be particularly influential in advancing the market value of iron and steel scrap has not been borne out by events. It was natural enough to entertain such a theory. For many months it appeared that scrap was selling at less than what might be called its "intrinsic" value, i.e., that the offerings were so large that buyers did not have to pay as much for it as they could afford to pay, considering its value to them in relation to pig iron. When coke becomes scarce, scrap is particularly useful. Certain forms, which are quite cheap relative to heavy melting steel, can be charged into the blast furnace with the effect of reducing the consumption of coke per ton of pig iron produced. Certain forms of scrap can be used advantageously in the open-hearth furnace to reduce the amount of pig iron needed to make a ton of steel, the saving in coke being in proportion to the amount of pig iron saved. The iron mill makes rolled material from scrap, taking the place of steel in the manufacture of which coke plays a part. Similarly the iron foundry can use scrap and get along with less pig iron from the blast furnace.

Scrap, however, has not had any remarkable price advance since last March, while recent reports indicate an easier position in the market. At no time have buyers of scrap found any difficulty in getting all they wanted, merely by paying slight advances in price. Some of the advances that have occurred in the scrap market, moreover, were produced more by the ingenuity of the sellers than by consumers bidding against each other.

The average quoted price of the ten descriptions of scrap given in the comparison table of THE IRON AGE was \$14.95 for March 28 last, and \$16.875 for July 18, showing an advance of \$1.925 per ton or about 13 per cent. In the same interval the composite of pig iron advanced \$5.23, or about 28 per cent, while the composite of finished steel advanced \$3 a net ton or 7½ per cent.

Thus scrap advanced barely more than one-third as much as pig iron in dollars per ton and less than one-half as much in percentage. It advanced more than did finished steel, but every one expects an average of finished steel products to be a slow-moving affair.

This showing agrees with the broader view that may be taken of the history and position of scrap. We seem to have passed into a new era. There was a time when scrap was regarded as one of the sensitive items in the general iron and steel market. Often an advance or decline in scrap prices foreshadowed what was likely to occur in pig iron or steel prices generally. When

scrap became scarce it was very scarce and when it became plentiful it was very plentiful.

Nowadays there is a much larger quantity of scrap moving, and the quantity is probably considerably larger than 15 or 20 years ago relative to the total tonnage of pig iron or steel produced. With larger tonnages, better facilities are provided for storing scrap and moving it as occasion requires. A scrap yard is an institution rather than a place where some junk chances to be piled. No small factor in this development is the magnet, which has facilitated greatly the handling of scrap.

A general principle is involved, that when the production of pig iron was increasing in geometric ratio, with a doubling every ten years, the old material coming out was naturally a smaller percentage of the new material being made than is the case when production is increasing at a more moderate rate. At the moment there is also the factor that a lot of material was left over from the war.

Employers the Buffer

When organized workmen demand of their employers higher wages and easier working conditions, under the guise of requiring a "living wage," the employers are only the buffer between their employees and the general public. The "living wage," which B. M. Jewell, president of the railroad shopmen's organization, sets at \$2,637 a year, is not in essence the number of dollars mentioned, but the things the number of dollars would buy at present prices. The men would not be content to be paid in depreciated dollars and have prices of everything go up correspondingly.

It is well established by various statistical investigations, the substantial accuracy of which cannot be questioned, that the sum total of production in the country is far from sufficient to furnish each worker a share equal to that demanded by those who have expressed the "living wage" in concrete form. When workmen demand a disproportionate share the demand can be granted only by the general public suffering to the extent of the extra amount involved. The employer feels the full shock, but it is so distributed that the individual member of the community suffers but a little part of each particular shock. In the aggregate, however, the pressure upon the public is the sum total of all the shocks.

Employers have been so unwilling to emphasize the fact that they must force pass the extra payments along, that the public has been encouraged to remain in the unthinking stage. The public needs to be educated to the fact that it, not the employer, pays in the long run. There is need of one publicity campaign after another to carry enlightenment to all workers.

As a matter of fact, the machinery for passing the expense of unreasonable wages or working conditions on to the public is in the most important cases in full view. More than one-third of all organized labor is taken care of under the Transportation Act, which requires the Interstate Commerce Commission to fix passenger and freight charges upon the public covering the expenses of

the railroads, whatever they may be. This is a plain legislative enactment. In the coal industry, where organized labor is largely represented, few if any are disposed to question that the long strikes or mining suspensions occasioned by the United Mine Workers are paid for by the public. In the building trades, where there is the third great group of organized workmen, the contractors make no secret of the fact that when they bid on a job they take cognizance of the wages they will probably have to pay and the number of days the workmen will be on the job. No contractor pretends that he pays any increase in wages out of his own pocket.

Surprise often is expressed that organized labor has the temerity to make the demands it does. It should not be particularly surprising. The surprise rather should be that employers make so little effort to advertise the fact that in these matters they are merely the buffers between their employees and the general public, and an equal surprise that the general public is not more roused by being forced to pay excessively for transportation service, for coal, for houses and for other things because organized labor demands more than its proper share of the total production of the country.

Evidence of the increased activity of manufacturing is given in the customs returns for May. The value of crude materials imported for use in manufacturing was 34 per cent greater in that month than for May, 1921, without taking into account the higher prices ruling a year ago, and the imports of "manufactures for further use in manufacturing" were valued at 64 per cent more than those of May a year ago.

Iron and Steel Production in Canada

The production of pig iron in June in Canada showed an increase of 23 per cent over the output of the previous month according to the statement issued by the Dominion Bureau of Statistics, Ottawa. A tonnage of 28,367 was reported for the month as compared with an output of 23,363 gross tons in May. The basic pig iron produced for the further use of the companies reporting increased by 8449 tons over the previous month's record. The malleable iron produced for sale also presented a substantial increase. On the other hand the production of ferroalloys in blast furnaces decreased from 2680 tons in May to 2051 tons in June, involving a reduction of 23 per cent.

The pig iron and ferroalloys produced during the first six months of the year presents a decline of 118,129 gross tons or 31.9 per cent from the output for the corresponding period of 1921. At the end of June last year six furnaces were in blast as compared with four furnaces in operation on June 30. One furnace was blown in in June by the Dominion Steel Corporation at Sydney, N. S., and two were blowing at the plant of the Algoma Steel Corporation, Sault Ste. Marie, Ont., and one at Hamilton, operated by the Steel Co. of Canada.

It may be of interest to quote the price of basic pig iron in this connection as given by one of the Canadian producers. The price was \$24 per ton in April; \$26 in May and \$27 in June. The Labor Department index of iron and steel wholesale prices, including eleven commodities reached the lowest point in April since 1916. The index for the month was 182.5 as compared with an advance to 184.2 in May.

With the exception of the output during February,

the steel production in June was the greatest for any single month this year. The output of castings was practically maintained while the production of ingots increased from 15,646 tons in May to 31,270 tons in June involving an increase of 99.8 per cent. As usual a large proportion of the output consisted of open hearth basic steel intended for further use. On the other hand 1318 tons of castings comprising three dif-

ferent grades of castings were produced for sale. A comparison of the cumulative steel production during the first six months of the present year with the record for the corresponding period of 1921, throws recent performance into an unfavorable light. The half year of 1921 was credited with an output of 295,140 tons, or 66.7 per cent more than the production of the first six months of the present year.

German Steel Prices and Costs Are Steadily Rising

Shortage of Supplies at Home Causes Export Market to Be Neglected—The "Catastrophe Boom" Goes On—Coal Situation Tightening

(Special Correspondence)

BERLIN, GERMANY, July 12.—The currency crisis which followed Dr. Rathenau's assassination has accentuated the existing tendencies in the German iron, steel and machinery trades. Prices are flying upwards, production cost is rising accordingly, the home market is buying so greedily that a general shortage of supply prevails and the export market is neglected and nearly all producers have orders for months ahead. Judging by experience, these familiar features of the so-called "catastrophe boom" will continue unless the reichsmark has not only a real recovery, but a recovery that is maintained for at least some months. Of this there is at present no sign.

Prices of the Steel Syndicate's products have undergone another all-round increase. The rise in coal prices came unexpectedly on July 1. Standard Ruhr coal (Fordergruskohlen, price in 1914 13.75 marks) was then increased from 890.30 marks to 1184 marks per metric ton, and all coal, coke and briquettes correspondingly. Foundry coke was raised from 1355 to 1851 marks. This was the result of a mining wage increase of 65 marks per man per shift. The average coal price increase was 31 per cent. The resulting increase in Steel Syndicate prices was given in **THE IRON AGE**, July 20, page 184.

A marked divergence as to price policy has shown itself among the groups represented in the Steel Syndicate. The pure producer firms stand solidly for higher prices. But many of the most influential producers are also increasingly consumers, owing to the co-operation of their mills with machine construction and shipbuilding concerns. This applies to Stinnes, Krupps with their machine and locomotive shops, the Gutehoffnungshütte, which operates with the important Augsburg-Nürnberg Machinery Co., and the Stumm concern, which as early as 1919, the chief lower Rhine plant of August Thyssen, used its whole steel production for its own finishing manufactures. This tendency was one of the factors causing the dissolution of the old Stahlwerks Verband, of which the present Stahlbund is an offshoot. The diversity of interest has tended to keep down Steel Syndicate prices. While the legal maximum pig iron prices have been raised four times since May 1, the Stahlbund products have been raised only twice. However, the new fall in mark exchange (the dollar having closed last week at 536) has again thrown the German prices far below those of the world market, and for a time German complaints of English, French and Belgian underselling of Stahlbund products have ceased.

Scrap iron is very firm, having risen between May 18 and July 3 from 4400 to 5800 marks, and being about 12-fold the 460 marks which was the low point reached in May, 1921. In the belief that this rapid rise is due partly to speculation, the Reichsrath has sanctioned an ordinance restoring official rationing and control of scrap, which may henceforth be requisitioned at fair prices and distributed to consuming concerns.

Fuel Scarcity Accentuated

The coal and coke shortage continues to be acute. The official limitation of self-consumption by combined

coal mining and smelting concerns imposed in June is still in force. The Government has decided to prolong the term for tax-free import of foreign coal from Sept. 1, 1921, to March 31, 1923. English coal is now being used in parts of Germany which it never reached before the war.

The Wirth Cabinet has resumed negotiations with the Allies, declaring that financially Germany cannot continue coal importations, and complaining that the Reparations Commission takes one-third of the whole supply of coking-coal, while it takes practically no brown coal.

The coal loss caused by the cession of Upper Silesia is put officially at 20 per cent. The Ruhr coal miners still refuse to agree to work extra shifts for much higher wages, and output is checked by a syndicalist agitation and by the flight of mining labor into the now reviving building trade. In May the Ruhr production per working day was only 310,844 tons against

The Iron Age and Its Readers

Frequently a letter has come to the editorial offices of **THE IRON AGE** relative to an article which the inquiring reader overlooked in the week of its publication. Having had his attention called to the article and its direct bearing on his business, the writer appealed to the editors to help him in locating it. This may be the experience of some **IRON AGE** readers in respect to the article on page 1754 of the issue of June 22, dealing with market prices in German metal-working industries, also the wages and hours of workers in those lines. The article brought out clearly the competitive possibilities of German products as determined by the exchange situation and the efficiency of German workers. A reader of **THE IRON AGE** writes: "It impresses me as the most illuminating review of this highly important subject that it has been my privilege to read."

Surprisingly interesting data are often found in documents which the average manufacturer and user of iron and steel rarely sees. **THE IRON AGE** of July 6, for example, gave two pages of little-known facts concerning iron and steel products which enter into the everyday life of the people, among them pins, pens, wood screws, snap fasteners and clasps, metal buttons, wire staples and steel wool and shavings. Coming to heavier things, this article, which was based on research of the United States Tariff Commission, gives interesting facts about woven wire cloth, chains, bolts and nuts, and wire for fencing and for baling hay. Many letters come in **THE IRON AGE** mail asking questions to which the article in the July 6 issue gives the answer.

326,637 tons in April and 333,862 tons in March.

Germany has practically ceased to export coal, with exception of compulsory reparations deliveries, and practically compulsory deliveries to Austria, Poland, Hungary, Danzig and Memel. The entirely free export to Holland, Switzerland and Czechoslovakia totaled in 1921 only 2½ million tons. With the mark exchange again depreciated, the price of English coal is far above German. The Essen "Bergwerks-Zeitung" predicts that further smelting furnaces will be blown out.

Pig iron is still being imported. Just before the last mark drop, the Pig Iron Syndicate sold imported Luxemburg foundry pig (No. 3) at 6800 marks.

The demand for rolling mill products is enormous. The State Railroad central office complains that it cannot get a sufficient supply of rails. For field, light and mine rails there is also an extraordinarily active demand. The export market in heavy rails is, however, sharply fought for. Germany's competitors of late have been offering very cheaply, and German firms declare that they cannot stand the 5 per cent export duty and the 2 per cent sales duty. This was before the new mark fall which has restored Germany's advantage.

Machine and electro-technical shops report having an abundance of old orders. Late last month they reported that few new orders were coming in, but since the mark collapse there have been symptoms of a new ordering boom.

German Exports to Holland Cut Down

Foreign trade reports show that the continuous home boom and the short supply (the two things are really one) have badly hit exports. Competitors have cut into Germany's chief market, Holland. In March

Holland imported 4,123,000 kg. of pig iron, of which 1,867,000 kg. came from Germany, 1,140,000 kg. from Belgium, and 586,000 kg. from England. In April, of 2,057,000 kg. imports only 543,000 kg. came from Germany, while 1,030,000 kg. came from Belgium. Of Holland's imports of 696,000 kg. of semi-finished products in March Germany supplied 440,000 kg., whereas in April she supplied only 153,000 kg. out of 349,000 kg. In cast and forged machine parts, etc., deliveries from Germany fell from 544,000 kg. to 366,000 kg., while the German delivery of iron plates of all kinds fell from 8,011,000 kg. to 4,913,000 kg., both English and Belgian sales having increased. Germany's exports of iron and iron wares of all sorts other than machines, but including machine parts, in January-April inclusive, were 811,680 metric tons, valued at 11,249,040,000 marks. The figures for these months of 1921 are still lacking. The export of machines was 146,889 tons, valued at 5,022,284,000 marks.

A new patent fee schedule came into force on July 1. The patent registration fee is 300 marks; the annual fee, for the first and second years is 300 marks, for the third, 400 marks; fourth, 500 marks, and so on progressively up to 20,000 marks for the fifteenth and last year. The Reichstag rejected the Government's proposal to lengthen the patent term to 18 years.

Under presidency of Herr Adolf Ebering of Westhofen, a number of firms in the small iron manufacturing branches have formed the Eisenzentrale G.m.b.H., which is to do all the iron and steel buying for its members. The Deutsche Bank, reports *Deutsche Export*, is behind a new Hungarian company, capitalized at 120,000,000 Hungarian crowns, formed for exploitation of the newly-discovered manganese ores in the Hungarian Comitat of Vessprim. Stinnes' Rhine-Elbe Union is about to lay down a new great iron works in the neighborhood of Dortmund.

ERRATIC MARKET

Much Anxiety in the Valley Districts—Sheet Maker Withdraws

YOUNGSTOWN, July 25.—Sales officials characterize the market as "erratic," as current unsettlements are creating considerable anxiety on the part of manufacturing consumers over steel supplies.

An independent whose blast furnace has been forced into suspension is protected on its pig iron requirements for 60 days, much of this iron having been purchased at \$18, before prices advanced. This interest has withdrawn from the sheet market for the time being.

In general, makers are showing little interest in new offerings, being satisfied to meet obligations of regular customers, if possible. In full finished sheets, merchant bars and pipe, district interests are falling behind in their obligations.

Little or no surplus iron is available from Valley interests, whose own supplies are becoming inadequate. The shopmen's strike has prevented resumption by a number of merchant furnace operators, which had prepared to blow in their stacks during July.

In the sheet market, a number of independents are endeavoring to meet requirements of their customers at the prices quoted by the leading interest. One maker, however, reports that it is getting some tonnages of black at 3.30c. and galvanized at 4.30c., or \$3 per ton above quotations of other producers. This same company likewise claims to be entering blue annealed tonnages at 2.60c., or \$4 per ton higher than the 2.40c. price of the leading maker.

All Valley sheet mills have a comfortable backlog on their books, and the problem of delivery is now paramount to that of sales.

There has been accelerated demand for plates from tank builders and car repair interests. The principal Valley maker is well filled on 84-in. mill plate sizes. Plate quotations vary, say consumers, from 1.70c. to

2.25c., though little tonnage is available for early delivery at the lower figures.

The market on merchant bars ranges from 1.75c. to 1.80c., with principal district independent declining new offerings.

All orders are being subjected to close scrutiny, in finished lines.

Important district shippers fear that a car shortage will follow in wake of settlement of the coal and railroad strikes, especially affecting open top equipment. Difficulties in car supply are anticipated through balance of the summer.

Melters are using larger tonnages of scrap since restrictions in iron output, with heavy melting grades moving to consumers at \$18.50.

Among the papers announced to be submitted to the technical sessions which will be held at the time of the eighth national exhibition of chemical industries at Grand Central Palace, New York, in the week of Sept. 11, are mentioned the following: "Steel Belts and Their Application to the Solution of Conveying Problems," by Harry Carlson, of Sandvik Steel, Inc., New York. "Moderation in Standardization," by W. D. Collins, United States Geological Survey, and "Standardized Testing Apparatus," by N. F. Harriman, United States Bureau of Standards.

New editions of its books on wheels, car blanks and circular forgings have been issued by the Carnegie Steel Co., Pittsburgh. One of these is devoted to wrought steel wheels for steam and electric railroad service. Besides the specifications of the American Society for Testing Materials, the book contains profiles with detailed dimensions of the wheels it manufactures. A separate booklet includes the profiles and tables of dimensions for various types of industrial car wheels, including crane wheels, and besides gear blanks, shows the form and range of sizes of piston blanks and pipe flange blanks regularly made.

JAPANESE BUYING LIGHT

Price Ideas Below Prevailing Market—Shanghai Market 15 Per Cent Below American Prices—Imports

NEW YORK, July 25.—A small but active trade continues with South American countries in merchant products, orders being usually of 50 to 75 tons. The Chinese market is dull as far as American exporters are concerned, as a result of the uncertainties of the political situation there. Because of inability of merchants to obtain advances from banks, warehouses in Manchuria are stated to be carrying less than 25 per cent of usual stocks. A recent cable received by a large export house dealing exclusively with China, reports that prices in the Shanghai market are about 15 per cent below the quotations now being received by importers from the United States. The needs in China are large and with any considerable improvement in the situation, exporters to this market expect a satisfactory run of buying.

Japan continues to buy rails, black sheets of light gage and some structural material. A recent order from the Keizo Electric Railway, Keizo, Corea, involving a small tonnage of 60-lb. and 92-lb. grooved rails, was divided between Suzuki & Co., and Mitsui & Co. A tonnage of steel scrap, for use in a large steelworks, has been contracted for with Asano Bussan & Co., 165 Broadway. The total contract is for about 10,000 tons and is being shipped c.i.f. Moji, in lots of 1000 and 2000 tons. Some small purchasing of structural material is noted and there is an inquiry in the market from a private interest involving about 200 tons of structural steel. A tender on tin plate for canning purposes, the annual requirement of the Japanese army, is in the market from the Imperial Government. When first issued it called for slightly more than 7000 base boxes, but was later reduced to about 4300 base boxes.

Japanese buyers are exhibiting a distinct tendency to bear the market. Whether this is because of a belief that lower prices are unobtainable from the United States than are being quoted, or because of lower offers from British sellers, is a question. Inquirers for tin plate have made counter offers to exporters of about

50c. per base box lower than the c.i.f. quotation made and on structural material the offers have been as much as \$5 per ton under the possible c.i.f. price at the present market. On light rails Japanese buyers seem to think they should be able to purchase from the United States at as low as \$50 per ton, c.i.f. Japanese port.

Japanese exporters in Japan will be partly financed by the Imperial Government, if a proposal to be presented to the Diet, proves successful. The plan is designed to aid Japanese exporters to compete in foreign markets by the extension of long-term credits, the Government furnishing one-half the necessary financial assistance. It is proposed to seek yen 100,000,000 from the Diet, if the plan is acceptable to the Government.

As the American domestic market ascends, importers become more and more convinced that they should be able to import foreign material. At the same time, the shortage of pig iron is influencing more consumers to interest themselves in foreign iron. While these efforts at importation are largely confined to pig iron, one export and import house in New York is offering shovel steel, about 0.40 to 0.60 per cent carbon, of English origin, at \$2 to \$3 per ton, f.o.b. New York, under the prevailing price.

According to the American consul at San Salvador, a contract involving about 4000 meters of 3½-in. iron pipe, 500 meters of 2-in. and 100 meters of 1-in. pipe, has been closed between the Water Supply Committee, Department of La Paz, San Salvador and J. Gerardo Flores, San Salvador. The pipe is to be installed for water supply to San Juan Talpa. A contract involving cast-iron pipe will be opened Aug. 16 by the Argentine Sanitary Works and calls for 8201 tons of pipe as well as a tonnage of valves and accessories. The material is for installation at Resistencia, Posadas, La Banda, Rawson and Jachal, Argentina. Bids are being received by the Secretaria del Directorio de las Obras Sanitarias de la Nacion, Charcas 1840, Buenos Aires, Argentina.

China's total production of pig iron annually, according to the estimates of K. Y. Kwong, engineering and mining authority, is about 450,000 tons from Chinese owned and operated furnaces and 250,000 tons from Japanese owned furnaces, says Commercial Attaché Julean Arnold at Pekin. The iron ore output is estimated at 2,000,000 tons.

FRENCH MARKET QUIET

About 50 Per Cent of Furnaces in Blast—Rise of Pound Sterling Aids Exports—Shortage of Skilled Labor.

(By Special Correspondence)

PARIS, FRANCE, July 13.—The domestic demand for iron and steel is very quiet, but there is more activity for export. The number of blast furnaces now in operation in the east of France is about 74: Lorraine (June 27), 37, out of a total of 66; Meurthe-et-Moselle (production in May, 178,000 tons), 37, out of a total of 85.

Reports recently published by large Lorraine works, such as Knutange, Rombas, etc., have shown material losses. These concerns hope, of course, to increase output, which will reduce costs; but, besides world economic conditions which restrict this expansion, there are other factors, such as a shortage of skilled labor. For instance, the Société de Redange-Dilling has blown out the only blast furnace it had in operation at its Redange works. The Société Lorraine Minière et Métallurgique, Thionville, has not yet re-started one blast furnace lately blown out because of lack of labor. It is a lack of labor also which prevents the Société Métallurgique de Knutange from blowing in the sixth blast furnace, out of its total of 10.

Iron Ore.—There is no change in the iron ore market. Transportation rates on French iron ore have been reduced as follows: Exported iron ore receives a 15 per cent reduction on old rates, reduced themselves by 10 per cent for full trainloads made up of cars owned by the railroad companies and by 15 per cent when

the cars are privately owned. Iron ore forwarded from a mine situated outside the eastern and northern areas to ironworks situated also outside those areas receives a 25 per cent reduction on old rates or 30 per cent if minimum consignment is 180 tons. These reductions will remain in force until Oct. 31.

Pig Iron.—Chill-cast foundry pig iron, No. 3 P. L., has declined to 205 to 210 fr. With the Belgian franc at 0.95 fr. French, Belgian pig iron is at about the same level. Very low prices f.o.b. Antwerp are being quoted for export by Lorraine works. The considerable rise of the British pound has greatly benefited French producers, who can now sell hematite pig iron easily, within the zone of penetration of British hematite, at 295 to 305 fr. Prices for the other areas are: Eastern area, 305 to 315 fr.; Center and Parisian areas, 325 to 330 fr.

Semi-Finished Steel.—Inland demand for semi-finished products is restricted, but a rather large export business is being done, in competition with Belgian and Luxembourg producers.

Finished Steel.—There is nothing new to report in plates and sheets, except that the rise of the British pound is greatly helping French producers. The base prices of the Comptoir des Tôles, delivered at average destinations, remain as follows: Flat bars, 590 fr. per metric ton; heavy sheets, 640 fr. per metric ton; medium sheets, 720 fr. per metric ton; light sheets, 900 fr. per metric ton. The prices of rolled merchant products, affected by the lack of orders, are lower, and purchasers easily obtain quotations as low as 400 fr. on large orders of heavy shapes. But on small orders of various specifications the price remains 420 to 430 fr. Steel wire is 450 to 470 fr.

Iron and Steel Markets

GREAT UNCERTAINTY

Emergency Order Brings a Crisis

Industry May Be Dependent for a Time on Fuel Stocks—A Week of Increasing Suspensions

The sweeping order of the Interstate Commerce Commission, effective Tuesday midnight, establishing priorities in all railroad traffic and in fuel distribution have thrown the steel trade into a condition of utmost uncertainty.

Under the war priorities of four years ago, steel as one of the chief war necessities was high on the priority list, but the order just issued requires that the iron and steel and allied industries wait for coal until the more essential consuming lines have been supplied.

An immediate effect, assuming that coal begins to move at once to the preferred classes, would probably be to take up most of the soft coal output, estimated at 4,000,000 tons this week, leaving steel and other industries to depend to a large extent upon their stocks. These represent in most cases not more than a 30 days' supply.

While recently the insufficiency of transportation and the lack of coal have affected steel production more than consumption, it is now to be expected that actual requirements of steel consumers will decrease along with the cutting off of shipments from mills. An unknown factor, in the absence of actual experience under the rationing scheme, is the extent to which the coal output of steel company mines will be taken for distribution among preferred consumers.

It is not to be overlooked that shipments of food and other preferred commodities as named on the Commerce Commission's list are fully provided for in the present movement of freight and that therefore the effect of the priorities in fuel distribution are the chief of the new factors introduced into the situation.

Before the announcement of the new order, which comes as this review is written, the slowing down in blast furnace and steel works operations was more noticeable than in the third week of July. Eastern Pennsylvania, Johnstown and the Mahoning and Shenango valleys had the most marked curtailment. The Pittsburgh district was nearly up to its operation of the preceding week.

In the week ending July 22, four additional blast furnaces were banked in the East, including one Bethlehem and one Sparrows Point, one at Sharpsville, Pa., and one at Leetonia, Ohio.

At best the outlook is for such a railroad congestion as will affect the entire industry for weeks to come.

Coke prices have advanced rapidly and Connellsville foundry coke has been sold at from \$14.50 to \$15, an advance of \$4.50 to \$5 within a week. Quotations on furnace coke are almost, if not fully, as high. Coal which sold at \$1.90 on April 1 and at \$3.50 under the agreement with Secretary Hoover, is now selling at from \$8 to \$9 and the Hoover schedule has been abandoned, although coal

companies are making deliveries at low prices on contracts. Considerable imports of British coal have been arranged for and there are some negotiations for British coke.

Due to the increasing scarcity of coke, there is a decided upward tendency in pig iron prices, with much irregularity. Advances range from 50c. on Alabama iron to as much as \$3 in some Northern centers on foundry and malleable grades. Sales have been limited and there is only fair inquiry. The largest sales of the week was 5000 tons of basic to a Cleveland steel company. Foreign pig iron has already advanced under increased demand and higher freight rates which have been brought about by contracting for the shipment of coal from England to the United States.

It is now definitely announced that reduced freight rates on pig iron from Birmingham to St. Louis, Cincinnati and Louisville will become effective Sept. 1, but there will be no reduction to Cleveland, Chicago, or other Northern points because Northern railroads would not agree to reductions proposed by Southern lines.

Scotch foundry iron has been sold for prompt shipment to Atlantic ports of the United States, and our London cable reports pending inquiries.

Railroad equipment business is still noteworthy. Not only have several more large car repair inquiries been put before the trade, involving upward of 8500 cars, but 5000 steel cars have been bought, taking probably 50,000 tons of steel, and the locomotive orders of the week aggregate more than 100.

Iron ore stocks at blast furnaces and on Lake line docks on July 1 were 25,367,000 tons, as against 30,066,000 tons one year previous. Furnace consumption of ore was 3,388,000 tons in June, compared with 3,294,000 tons in May, an indication that until the railroad strike operations were being well maintained.

Pittsburgh

Curtailment of Operations More General — Outlook Uncertain

PITTSBURGH, July 25.—The slowing down in blast furnace and steel mill operations is beginning to reach impressive proportions. Thus far the most serious curtailment has been in eastern Pennsylvania at Johnstown, and in the Mahoning and Shenango Valleys. The immediate Pittsburgh district is still running fairly well, but it also will suffer severely within a few weeks unless there is a great improvement in fuel supplies. Nearly all the by-product plants are receiving much less coal than formerly. Some have had to curtail operations already, while others are running on stocks, which will not last long, a 30-day stock being probably the greatest at any by-product plant. The chief cause of present trouble is the inability of railroads to move Kentucky and West Virginia coal, this having been lately the principal dependence of Ohio, western Pennsylvania and Buffalo by-product coke plants and the chief cause of railroad incapacity is the shopmen's strike, although some congestion had developed by the middle of June.

Thus far the insufficiency of transportation and the lack of coal has affected steel production more than steel consumption, but it is the common view in Pittsburgh

A Comparison of Prices

Advances Over the Previous Week in Heavy Type, Declines in Italics
At date, one week, one month, and one year previous

For Early Delivery

Pig Iron, Per Gross Ton:	July 25, 1922	July 18, 1922	June 27, 1922	July 26, 1921
No. 2x, Philadelphia†	\$28.77	\$27.64	\$27.82	\$21.35
No. 2, Valley furnace†	25.00	24.00	24.00	19.50
No. 2, Southern, Cin'tif†	22.55	22.05	23.00	24.50
No. 2, Birmingham, Ala.†	18.50	18.00	18.00	20.00
No. 2 foundry, Chicago*	25.00	24.00	23.50	18.50
Basic, del'd, eastern Pa.†	25.75	25.75	25.00	21.25
Basic, Valley furnace†	24.00	24.00	25.00	19.00
Valley Bess., del. Pitts.†	26.77	26.77	26.96	22.46
Malleable, Chicago*	25.00	24.00	23.50	18.50
Malleable, Valley	27.00	24.50	24.50	20.50
Gray forge, Pittsburgh.†	26.27	25.27	25.46	21.46
L. S. charcoal, Chicago.†	31.65	31.65	32.00	36.00
Ferromanganese, seaboard	67.50	67.50	67.50	70.00

Rails, Billets, Etc., Per Gross Ton:

O-h. rails, heavy, at mill.	\$40.00	\$40.00	\$40.00	\$47.00
O-h. billets, Pittsburgh.†	35.00	35.00	35.00	30.00
O-h. billets, Pittsburgh.†	35.00	35.00	35.00	30.00
O-h. sheet bars, P'gh.†	35.00	35.00	35.00	32.00
Forging billets, base, P'gh.	40.00	40.00	40.00	35.00
O-h. billets, Phila.†	40.17	40.17	40.74	35.74
Wire rods, Pittsburgh.†	40.00	40.00	40.00	42.00
Skelp, gr. steel, P'gh, lb.†	1.70	1.70	1.70	1.90
Light rails at mill.†	1.75	1.75	1.60	1.85

Finished Iron and Steel,

Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Iron bars, Philadelphia.†	1.925	1.925	1.96	2.10
Iron bars, Chicago.†	2.00	1.90	1.75	1.85
Steel bars, Pittsburgh.†	1.70	1.70	1.70	1.75
Steel bars, Chicago.†	1.75	1.75	1.75	2.13
Steel bars, New York.†	2.04	2.04	2.08	2.13
Tank plates, Pittsburgh.†	1.70	1.70	1.70	1.80
Tank plates, Chicago.†	1.75	1.75	1.75	2.18
Tank plates, New York.†	2.04	2.04	2.08	2.18
Beams, Pittsburgh.†	1.70	1.70	1.70	1.85
Beams, Chicago.†	1.75	1.75	1.75	2.23
Beams, New York.†	2.04	2.04	2.08	2.23
Steel hoops, Pittsburgh.†	2.50	2.50	2.40	2.50

*The average switching charge for delivery to foundries in the Chicago district is 61c. per ton.

†Silicon, 1.75 to 2.25. †Silicon, 2.25 to 2.75.

The prices in the above table are for domestic delivery and do not necessarily apply to export business.

Sheets, Nails and Wire, Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Sheets, black, No. 28, P'gh.†	3.15	3.15	3.15	3.00
Sheets, galv., No. 28, P'gh.†	4.15	4.15	4.15	4.00
Sheets, blue an'l'd, 9 & 10	2.40	2.40	2.40	2.40
Wire nails, Pittsburgh.†	2.40	2.40	2.40	2.75
Plain wire, Pittsburgh.†	2.25	2.25	2.25	2.50
Barbed wire, galv., P'gh.†	3.05	3.05	3.05	3.40
Tin plate, 100-lb. box, P'gh.†	\$4.75	\$4.75	\$4.75	\$5.50

Old Material, Per Gross Ton:

Old Material, Per Gross Ton:	Cents	Cents	Cents	Cents
Carwheels, Chicago.†	\$19.50	\$19.50	\$18.25	\$12.50
Carwheels, Philadelphia.†	17.50	17.50	17.50	16.00
Heavy steel scrap, P'gh.†	17.25	17.25	17.00	12.00
Heavy steel scrap, Phila.†	15.00	15.00	15.00	11.00
Heavy steel scrap, Ch'go.†	15.50	15.50	14.75	10.00
No. 1 cast, Pittsburgh.†	19.00	19.00	19.00	16.00
No. 1 cast, Philadelphia.†	17.50	17.50	19.00	17.00
No. 1 cast, Ch'go (net ton)	17.00	17.00	16.50	11.50
No. 1 RR. wrot., Phila.†	17.50	17.00	17.00	13.50
No. 1 RR. wrot., Ch'go (net)	13.50	13.50	13.25	9.00

Coke, Connellsville, Per Net Ton at Oven:

Coke, Connellsville, Per Net Ton at Oven:	Furnace coke, prompt.†	\$14.00	\$11.00	\$7.50	\$2.75
Foundry coke, prompt.†	14.00	11.00	8.00	4.00	

Metals,

Metals, Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Lake Copper, New York.†	14.00	14.00	13.75	12.50
Electrolytic copper, refin'y	13.75	13.75	13.50	12.25
Zinc, St. Louis.†	5.95	5.75	5.27 1/2	4.25
Zinc, New York.†	6.30	6.10	5.62 1/2	4.75
Lead, St. Louis.†	5.40	5.50	5.55	4.35
Lead, New York.†	5.75	5.75	5.80	4.40
Tin (Straits), New York.†	32.12 1/2	31.50	31.00	26.00
Antimony (Asiatic), N. Y.†	5.25	5.00	5.00	4.65

Based on prices of steel bars, beams, tank plates, plain wire, open-hearth rails, black pipe, and black sheets.

These products constitute 88 per cent of the United States output of finished steel.

Based on average of basic and foundry irons, the basic being Valley quotation, the foundry an average of Chicago, Philadelphia and Birmingham.

steel circles that the actual requirements of steel consumers will decrease almost as much as the supplies of steel. Thus far, however, buyers of steel have not exhibited any expectation that their consuming ability will be much decreased and they are clamoring for deliveries for steel while mills are endeavoring to regulate their deliveries to the respective requirements of customers.

There is somewhat more urgent inquiry in connection with the purchase of products for prompt mill deliveries, but the tonnages called for are relatively small. Premiums for early delivery are tending to increase. They apply almost entirely to assured early deliveries, rather than to moderately early deliveries. Buying from warehouse, in place of ordering for direct mill shipment, has increased, orders not infrequently being for whole carloads, particularly in butt weld pipe. Pittsburgh warehouses are endeavoring to avoid taking orders that should go direct to mill, and preserve their warehouse facilities to meet regular small lot requirements. Pittsburgh warehouse prices were advanced \$3 a ton last week, to 2.35c. for bars and 2.45c. for plates and shapes.

In iron and steel circles, regret is universally ex-

pressed that the industrial outlook, recently so promising, should be clouded by the railroad and coal strikes. The augury for autumn business is much less favorable than 30 or 60 days ago.

The mill price of 1.60c. on bars, shapes and plates, occasionally quoted in the past few weeks on particularly desirable orders for indefinite delivery, seems now to have disappeared entirely, leaving the market squarely on a 1.70c. minimum.

Pig Iron.—Only one or two merchant furnaces in western Pennsylvania and the Valleys are in operation, nearly all of the few that were in operation 30 days ago having had to bank or blow out on account of inability to obtain coke. The furnaces have some stocks. Consumers are very apathetic and it might be difficult to sell any considerable tonnage of pig iron regardless of the price, while on the other hand forced purchases would probably develop very high prices. A sale of 200 tons of standard Bessemer iron of immediate shipment was made last Friday at \$25, Valley, the price formerly quoted. On the same day, a sale of 100 tons of malleable was made at \$27, Valley, which illustrates the vagaries of the market. A sale of basic iron is believed to have been made within a week on the basis of

July 18, 1922, 2.169c.
June 27, 1922, 2.169c.
July 26, 1921, 2.364c.
10-year pre-war average, 1.689c.

July 18, 1922, \$23.61
June 27, 1922, 24.05
July 26, 1921, 19.48
10-year pre-war average, 15.72

about \$24, Valley, following recent sales at that price or a shade lower. On the other hand, it is not definitely known where any more could be had at any price. Foundry iron sold a few days ago at \$25, Valley, or \$1 advance over last week's quotations. A higher price might be obtained now, but there is no inquiry of importance and there are no regular asking prices.

We quote Valley furnace, the freight rate for delivery to the Cleveland or Pittsburgh district being \$1.77 per gross ton:

Basic	\$24.00
Bessemer	25.00
Gray forge	\$24.50 to 25.00
No. 2 foundry	25.00
No. 3 foundry	24.50 to 25.00
Malleable	27.00

Ferroalloys.—There is nothing new in the ferroalloy market, as mills exhibit no interest in purchases on account of prospects of greatly decreased operations.

We quote 78 to 82 per cent ferromanganese, \$67.50 c.i.f. Atlantic seaboard for domestic; British, spot, \$70; British, future, \$67.50; German, 76 to 80 per cent, \$66. Average 20 per cent spiegelisen, \$36 furnace; 16 to 19 per cent, \$35 furnace; 50 per cent ferrosilicon, domestic, \$55 to \$60 furnace, freight allowed. Bessemer ferrosilicon is quoted f.o.b. Jackson and New Straitsville, Ohio, furnaces as follows: 10 per cent, \$41.50; 11 per cent, \$44.80; 12 per cent, \$48.10; 13 per cent, \$52.10; 14 per cent, \$55.10; silvery iron, 6 per cent, \$30; 7 per cent, \$31; 8 per cent, \$32.50; 9 per cent, \$34.50; 10 per cent, \$36.50; 11 per cent, \$39; 12 per cent, \$40.50. The present freight rate from Jackson and New Straitsville, Ohio, into the Pittsburgh district is \$4.06 per gross ton.

Iron and Steel Bars.—Pressure for deliveries of steel bars continues heavy, but it does not appear that consumers are actually short of bars to any appreciable extent. The Carnegie Steel Co., which had lately been accepting some orders at 1.60c. for indefinite delivery, will not now sell at less than 1.70c. in any case and is very reserved about making further commitments.

We quote steel bars rolled from billets at 1.70c. to 1.80c.; reinforcing bars, rolled from billets, 1.70c. to 1.80c. base; reinforcing bars, rolled from old rails, 1.60c.; refined iron bars, 2.20c. in carloads, f.o.b. mill, Pittsburgh.

Structural Shapes.—The turnover in structural shapes is very light, and on account of previous commitments, mills are very reserved about selling.

Steel Rails.—The market is quiet in both standard and light rails. Coal mines are interested only in resuming production and do not feel in position to plan any improvements at this time.

We quote 25 to 45-lb. sections, rolled from new steel, 1.75c. base; rolled from old rails, 1.60c. to 1.65c. base; standard rails, \$10 per gross ton mill for Bessemer and open-hearth sections.

Wire Products.—Demand for nails is unusually heavy for this time of year, but is being met by mills without much difficulty. Regular prices are unchanged. Detailed prices are given on page 245.

Cold-Finished Steel Bars and Shafting.—Producers expect to have difficulty in making deliveries against sales and contracts already made, as deliveries of hot-rolled bars have slowed down somewhat and are likely to slow down still more. While some sales have been lately at 2.10c., the common asking price has been 2.25c. and this would probably be insisted upon now, as producers do not care to take on any more tonnage with manufacturing conditions so uncertain. Ground shafting is firm at 2.50c. base, f.o.b. mill, and 2.60c. in less than carloads.

Rivets.—Following an advance of \$3 per ton on rivets made on June 7 by leading makers there has been a further advance made of \$5 per ton on all grades of rivets, effective from Monday, July 24. Local makers now quote 2.65c. base on button head structural rivets and 2.75c. base on cone head boiler rivets, 7/16-in. and smaller now being 70 to 70 and 5 per cent off.

Plates.—The plate mills that have been actively in the market of late are comfortably sold up, while a number of plate mills have been practically out of the situation, considering their costs too high to justify competing for business. While premiums are obtainable for early deliveries, this applies only to small lots, not enough to enable an idle mill to accumulate a back-log. The minimum on plates is now 1.70c., and this is only for indefinite delivery. Prices are given on page 245.

Tin Plate.—Some additional business has come to

mills in the past week on account of crop prospects becoming still more favorable. Southern California will have the largest fruit and vegetable pack in history. On account of steel shortage, tin plate mills are unable to average more than about a 75 per cent operation and this is approximately the present rate. Prices are given on page 245.

Track Equipment.—Railroads are showing little interest in track equipment, as they are busy with labor matters. Demand for small spikes continues active. We continue to quote \$2.25 on standard railroad spikes and \$2.50 on small spikes and boat and barge spikes.

Billets and Sheet Bars.—The market is altogether inactive. Some sheet bars are offered for shipment from Newport, Ky., but there are few mills near enough to make the offer at all interesting. Producers generally are unwilling to sell while sheet and tin plate mills are uncertain, as to how much they will be able to consume. The market is more or less nominal, but is quoted at the old price of \$35 for standard billets, small billets and sheet bars.

We quote 4 x 4-in. soft Bessemer and open-hearth billets at \$35; 2 x 2-in. billets, \$35; Bessemer and open-hearth sheet bars, \$35; slabs, \$35; forging billets, ordinary carbons, \$40, all f.o.b. Youngstown or Pittsburgh mills.

Iron and Steel Pipe.—There is some intimation of a coming advance in the prices of both iron and steel pipe, but so far absolutely nothing reliable has been given out by the mills. Costs of making pipe in the past month or more are much higher than they were, and it is said that on certain sizes the mills could not break even at the present ruling. The demand for 1/2-in. butt and 1-in. lap welded black pipe is heaviest ever known in the history of the trade, these sizes being used largely in new building work. The leading interest is said to be filled up to October and independent mills for 60 days or longer. Discounts are given on page 245.

Hot-Rolled Strips.—The demand is more active now than for some time and prices are strong. None of the mills is getting out normal production owing to the coal and rail strikes, and the supply of cars is getting to be short in some districts. The automobile builders have been heavy buyers for some time and are still taking a good part of present production. On light gages of hot-rolled strips two or three mills are asking about \$2 per ton advance over base prices and are able to get it in some cases. We quote hot-rolled strips at 2.50c. base, Pittsburgh.

Cold-Rolled Strips.—The market is fairly active and mills report they are sold up for six weeks or two months. Prices may advance on account of the higher manufacturing costs due to the coal and rail strikes. We quote cold-rolled strips at 4c. base at mill, Pittsburgh.

Sheets.—Sheet mill operations have been decreasing somewhat of late, chiefly on account of shortage of steel and fuel, although labor supply is a factor at a few points. In general, it is doubtful whether production in point of actual tonnage is at much above 75 per cent of capacity. The American Sheet & Tin Plate Co. has had to curtail its sheet mill operation slightly on account of the steel requirements of its tin plate mills and now has its sheet and tin mills equally scheduled to a 75 per cent operation. All producers are very reserved about making sales, being already well filled with business against their prospective rate of operation. New demand is far from insistent in point of tonnage. There are few sellers on the basis of 3.15c. common black and then only for rather indefinite delivery, while anything like prompt delivery would command a substantial premium. Prices on sheets are given on page 245.

Steel Skelp.—Several local makers report inquiry very active and say they can sell a good deal more skelp in the open market than they are able to turn out. The output has been going down in the last two weeks by reason of the coal strike and the slow movement of coal by the railroads. We continue to quote grooved and sheared skelp from 1.70c. to 1.80c. at mill, depending on the order.

Wire Rods.—While sellers of rods have not formally changed their quotations, they are indisposed to take on new commitments, unless from old and regular customers.

We quote No. 5 common basic or Bessemer rods to consumers, \$40; chain rods, \$40; screw stock rods, \$45; rivet and bolt rods and other rods of that character, \$40; high carbon rods, \$47 to \$50, depending on carbon, per gross ton, f.o.b. Pittsburgh or Youngstown.

Coal and Coke.—Very little coke is being sold and standard furnace coke has brought \$14 to \$15 for a few small lots, while Connellsville steam coal ranges in price from \$8 up to \$9 per ton. It will be recalled that Secretary Hoover fixed a maximum of \$3.50 per ton at mines for Connellsville coal, but the agreement is apparently forgotten by all operators, although they are delivering coal sold some time ago at low prices.

Old Material.—There is confusion in the local scrap market due to the orders issued by two or three mills to dealers to hold up shipments of heavy melting steel which was coming to them on contract. The mills have taken this action because of the coal and rail situation, as they will not need more scrap unless they have coal and coke with which to operate. In a certain sense this has created a weakness in the market. One steel company has bid \$17.50, delivered, for a small tonnage of No. 1 steel scrap, but it has rejected much material lately and dealers are slow to sell to it. They can pick up steel at about \$17. Another company is reported to have paid a railroad \$19 for knuckles and couplers and to have paid a dealer \$21 for the same grade. The market as a whole is quiet and no marked resumption of activity is expected until the coal and railroad troubles are out of the way. The prices quoted represent dealers' views as to what they would sell for under present conditions.

We quote for delivery to consumers' mills in the Pittsburgh and other districts taking the Pittsburgh freight rate as follows per gross ton:

Heavy melting steel, Steubenville, Follansbee, Brackenridge, Monessen, Midland and Pittsburgh.....	\$17.25
No. 1 cast, cupola size.....	\$19.00 to 20.00
Rerolling rails, Newark and Cambridge, Ohio; Cumberland, Md.; Huntington, W. Va., and Franklin, Pa.	17.00 to 17.50
Compressed sheet steel.....	15.50 to 16.00
Bundled sheets, sides and ends.....	14.50 to 15.00
Railroad knuckles and couplers.....	18.50 to 19.00
Railroad coil and leaf springs.....	18.50 to 19.00
Low phosphorus standard bloom and billet ends.....	20.50 to 21.00
Low phosphorus plates and other grades.....	19.00 to 20.00
Railroad malleable.....	16.00 to 16.50
Iron car axles.....	25.00 to 26.00
Locomotive axles, steel.....	24.00 to 25.00
Steel car axles.....	17.50 to 18.00
Cast iron wheels.....	18.50 to 19.00
Rolled steel wheels.....	18.50 to 19.00
Machine shop turnings.....	14.00 to 14.50
Sheet bar crop ends.....	19.50 to 20.00
Heavy steel axle turnings.....	15.50 to 16.00
Short shoveling turnings.....	15.00 to 15.50
Heavy breakable cast.....	18.00 to 18.50
Stove plate.....	15.00 to 15.50
Cast iron borings.....	16.00 to 16.50
No. 1 railroad wrought.....	15.00 to 15.50

Drastic Curtailment May Be Necessary

YOUNGSTOWN, OHIO, July 25.—The opinion is growing in industrial circles that drastic curtailments will occur in the steel industry after Aug. 1 unless transportation and coal mining difficulties are quickly adjusted. Plants are encountering much difficulty in maintaining schedules.

Shortage of pig metal forced suspension following the night turn Tuesday of No. 2 puddling mill of the A. M. Byers Co., Pittsburgh, at its Girard plant. This mill contains 44 puddling furnaces, of which 30 have been operating. The 30 active puddling furnaces in No. 1 mill will continue active until the end of the week, when they will also suspend. The company's blast furnace at Girard has been idle for several months because of inability to cover on fuel requirements.

The Brier Hill Steel Co. plans to bank Jeannette blast furnace this week because of coal shortage.

MANY BUSY PLANTS

Springfield, Ohio, Companies Busy in Spite of Strikes

SPRINGFIELD, OHIO, July 20.—A steady improvement in the business conditions of Springfield and vicinity is reported by the local manufacturers. President T. W. Ludlow, of the Springfield Malleable Iron Co., says that there is a good local demand for castings as well as from the general trade. The company has large orders from car works; also for small castings. At present the plant is being operated with about 80 per cent of its normal force. The company is well supplied with pig iron and coal, Mr. Ludlow says, so that he is not worried as a result of the strike.

The Ohio Steel Foundry Co. is operating with a good force of men, filling orders for the locomotive works at Lima and the Standard Car Co., Butler, Pa. There is a steady demand for castings for motor trucks and automobiles. The company is employing about 65 per cent of its normal force.

A slight improvement is noticed in the machine tool business, Edward Montanus, of the Springfield Machine Tool Co., said. This is especially true regarding the past few weeks. Mr. Montanus said, however, that as a result of the strike the railroad companies are holding up orders for machine tools.

Business is gradually getting better in the gas engine line, according to President H. C. Blake, of the Foos Gas Engine Co. The Superior Gas Engine Co. is operating with almost its normal force. It is getting out engines for the oil fields. The company has started the construction of an attractive office building, which will be of reinforced concrete and brick. During the last few years the company has completed the erection of a model plant, which it is estimated cost more than \$500,000. P. J. Shouvin is president of the company and director of the Mad River National Bank.

"We are running some overtime," said President A. F. Sparks, of the James Leffel & Co., manufacturers of water wheels. "Things are coming along well, and we are getting a number of good orders." Recently the company booked orders for turbines for cities in Indiana and other points in the Central West.

C. J. Burton, vice-president and treasurer the G. F. Burton Co., dealer in pig iron, who has just returned from a trip through Ohio and Indiana, says that there is a general improvement in conditions and that there is an increasing demand for pig iron.

Local agricultural implement manufacturing companies which have been running light for the past year are beginning to see encouraging signs for the future. The American Seeding Machine Co. is expecting good orders from South America and Australia. These should be received by the middle of August. President Frank C. Johnson says that prospects are good for a fair fall seeding machine trade, according to reports from the travelers and dealers.

Considering the lateness of the season, the motor truck and automobile manufacturing companies here are doing good business. While the Kelly-Springfield Motor Truck Co. is forging ahead on its schedule of trucks, owing to increasing orders, the Springfield works of the International Harvester Co. is not so active. It has been turning out an average of 50 high speed trucks since early spring. Lately this number has been reduced to 25 trucks per day.

The Westcott Motor Car Co. reports that business is holding up well and that indications are that July will be practically as good as June, which was the record month since 1920. This company is having difficulty in getting parts, which is delaying the assembling of the machines.

The big plant of the Robbins & Myers Co., motors and fans, closed Saturday, July 15, until July 31, for the annual inventory and vacation period. Indications are that there will be a steady improvement in orders for motors, the officers say. Normally this company employs 3200 persons. F. H. Hunting, of Fort Wayne, Ind., formerly with the General Electric Co., took charge as president of the Robbins & Myers Co.

Chicago

Strikes an Increasingly Important Factor in Prices and Production

CHICAGO, July 25.—The shadow of the restrictive influence of the coal and railroad strikes is rapidly falling on the iron and steel industry in this district, and, while as yet there has been no material decline in plant operations, the end of fuel reserves is only a few weeks off and unless there is an early change for the better, most of the producers now running at a relatively high rate will be forced to suspend. With coal stocks getting very low and with such new supplies as are available costing up around \$12 to \$13 a ton delivered, attention is diverted sharply to costs, and in the past few days there has been either a withdrawal by steel makers from the market or an advance in prices calculated to cover the indicated producing charges.

While the Steel Corporation subsidiary here still is taking business in the major products on a base of 1.75c., Chicago, independents generally have advanced prices \$3 per ton to a base of 2c., Chicago. The Inland Steel Co. still is in a position to take on some gages of plates and small structural shapes, but on other products is out of the market and on plates and shapes it is picking its orders. Operations by this company still are placed at between 65 and 70 per cent. The Illinois Steel Co. is operating between 84 and 85 per cent, while the Interstate Iron & Steel Co. reports full operations.

An advance of \$1 a ton in all grades of Northern iron is due less to the demand than to the fact that with costs steadily mounting, producers feel it is dangerous to gamble on an early settlement of labor troubles. There is not much hope that fuel will be plentiful and reasonable in the near future and only the advent of such a condition would make possible profitable production of iron at recent prices.

There seems to be no let up in the demand for steel from the automotive industry and there continues to be a good deal of urgency to the demand for railroad track supplies. Railroad business in general is pretty heavy, with the week's business including a sizable total of both locomotives and cars and much repair work about ready to be placed.

The most favorable word that can be said about the railroad strike in this territory is that it is not spreading beyond the shopmen. A strike of the Chicago surface elevated street railroad men threatens. This would be bad for industrial Chicago in view of the fact that a very large percentage of those engaged in business use the street railroads and also because the storage of coal is resulting in the cancellation of a good many suburban trains by the steam roads. If all the troubles which now threaten actually occur, it would cause no stretch of imagination to picture almost complete suspension of business activity.

Pig Iron.—Real activity is lacking in all grades and while a few sales of lots amounting to 500 tons have been put through, the more common purchase is of one or two carloads. We note sales of two 500-ton lots of Southern foundry at \$18.50, Birmingham, for the base grade and there have been several smaller lots at the same figure. Other furnace interests continue to quote Southern foundry at from \$19 to \$20 at furnace for No. 2 grade, but without getting much business. A sale of 600 tons of No. 1 Northern iron is reported to an agricultural implement maker at the recent Chicago base. On the whole, there is more demand for shipments against contracts than there is for fresh supplies and that is surprising in view of the fact that if the blast furnaces are forced to suspend because of the fuel shortage, melters no doubt would be affected in the same way. The most recent sale of basic iron here was involving a round tonnage for delivery at the convenience of the maker at \$24 and the new prices on this and other grades have been in effect for too brief a period to have yet found basis in sales. A sale of 400 to 500 tons of high silicon iron to one of the automobile manufacturers is reported to have been made for shipment from Jackson, Ohio, but full details are not available.

Quotations on Northern foundry, high phosphorus malleable and basic irons are f.o.b. local furnace and do not include a switching charge of 61c. per ton. Other prices are for iron delivered at consumers' yards, or when so indicated, f.o.b. furnace other than local.

Lake Superior charcoal, averaging		\$31.15
Northern coke, No. 1, sil. 2.25 to 2.75	\$25.50 to	26.50
Northern coke, foundry, No. 2, sil.		
1.75 to 2.25	25.00 to	26.00
Northern high phos.	25.00 to	26.00
Southern No. 2	24.50 to	26.00
Mallesable, not over 2.25 sil.	25.00 to	26.00
Basic	25.00 to	26.00
Low phos. Valley furnace, sil. 1 to 2	34.00 to	35.00
per cent copper free		
Silvery, sil. 8 per cent		37.25

Bars.—The supply situation in mild steel bars is growing more acute and while the Steel Corporation subsidiary has made no change from 1.75c. base, Chicago, the independents are decidedly stronger. The Inland Steel Co. has virtually withdrawn from the market and has no regular quotation, while other independents in a position to take on tonnages for relatively early delivery are talking 2c. minimum. There has been no let up in the demand; indeed, as a result of the fact that Eastern mills are falling behind instead of gaining upon their obligations, local mills are getting an increased number of inquiries. The Steel Corporation price, as for some time past, refers entirely to such business as buyers are willing to place for delivery at the convenience of the mill. Makers of hard steel bars are heavily committed for the present quarter and indisposed to commit themselves further until they have a definite line on what last quarter is going to produce with regard to the fuel, labor and transportation conditions. On iron bars, 2c. Chicago or mill now is minimum and one important maker having no stated quotation has to-day withdrawn all prices and is accepting specification only on the basis of price in effect at time of shipment. This development is solely ascribable to the shortage of coal and the probability of changing costs. Warehouse prices on bars and bar mill products have been advanced \$2.40 to \$3 per ton.

Mill prices are: Mild steel bars, 1.75c. to 2c., Chicago; common bar iron, 1.90c. to 2c., Chicago; rail carbon, 1.70c. mill or Chicago.

Jobbers quote 2.60c. for steel bars out of warehouse. The warehouse quotation on cold-rolled steel bars and shafting is 3.55c. for rounds and 4.05c. for flats, squares and hexagons. Jobbers quote hard and medium deformed steel bars at 2.50c. base; hoops, 3.60c.; bands, 3.35c.

Bolts and Nuts.—Jobbers and consumers are specifying fairly freely on contracts at the prices in effect prior to July 1. While new business is not large, there is a fair volume in the aggregate and at the new prices. The Michigan Bolt & Nut Co., Detroit, as of July 20, met the advance in machine carriage bolts and lag bolts made July 1 by other makers. Jobbing prices of rivets have been advanced \$3 per ton and a further advance is indicated by the mill advance of \$5 a ton made by Eastern makers, effective July 24. The full list of discounts will be found on page 245, except that, as to this territory, they are f.o.b. Chicago instead of Pittsburgh.

Jobbers quote structural rivets, 3.25c.; boiler rivets, 3.35c.; machine bolts up to $\frac{1}{4}$ x 4 in., 50, 10 and 10 per cent off; larger sizes, 50 and 10 off; carriage bolts up to $\frac{1}{4}$ x 6 in., 50 and 5 off; larger sizes, 45 off; hot pressed nuts, squares and hexagons, tapped, \$3.25 off; blank nuts, \$3.50 off; coach or lag screws, gimlet points, square heads, 60 per cent off; quantity extras are unchanged.

Wire Products.—The past week has shown a little more activity, although distributors still are more disposed to seek deliveries against old orders than to enter new orders. The leading interest still is several weeks behind in its deliveries and this condition throws much of the early shipment business to the independents, who, however, are generally quoting the Steel Corporation basis. Wire rods are scarce in this district and \$40 per gross ton is the absolute minimum.

We quote warehouse prices, f.o.b. Chicago: No. 9 and heavier black annealed wire, \$3.10 per 100 lb.; No. 9 and heavier bright basic wire, \$3.25 per 100 lb.; common wire nails, \$3.25 per 100 lb.; cement coated nails, \$2.75 per keg.

Sheets.—The leading independent maker in this district within the past few days has practically withdrawn from the market. It is comfortably filled with business for the present quarter, and fearing higher costs, has instructed salesmen and branch offices to submit all inquiries. The general situation is a little

mixed. The automobile manufacturers figuring upon a big demand from the agricultural districts when money begins to flow back from the crops, still are running heavily and specifying freely for sheets. Demand for galvanized sheets also is good, but several of the independent mills are eager for business in black sheets. The market is not quotable above 3.15c., base, Pittsburgh, for black sheets, but on other finishes where prompt shipment is required, premiums are being obtained. A good many inquiries are coming to this market from consumers who are not getting full shipments from mills in the East. The automotive industry is being watched closely for signs of slowing up and there is conservatism about taking orders from irregular consumers in the fear that the business is merely a duplication of that already placed and would be cancelled on the first sign of an easier delivery situation.

Mill quotations are 3.15c. to 3.30c. for No. 28 black, 2.40c. to 2.50c. for No. 10 blue annealed and 4.15c. to 4.30c. for No. 28 galvanized, all being Pittsburgh prices, subject to a freight rate to Chicago of 34c. per 100 lb.

Jobbers quote blue annealed, 3.75c.; black, 4.45c.; galvanized, 5.45c.

Plates.—It is increasingly difficult to place orders for plates for prompt deliveries and with many inquiries coming here on account of the inability of Eastern mills to accept new business, the price situation is growing stronger. The Steel Corporation subsidiary has made no change in base price, but it is doubtful whether independent makers would to-day take on business at less than 2c. The Inland Steel Co. is pretty heavily committed and while it can take some business in heavy material, it is asking its sales offices to submit all inquiries and has no stated price. About 30,000 tons of steel mostly plates will be required for the 3000 composite gondolas recently placed by the Illinois Central Railroad. There has been a marked revival in the demand for oil storage tanks and builders in this territory are figuring on a large number. Details of this business are not yet available. The warehouse price of plates has been advanced to 2.70c.

The mill quotation is 1.75c. to 2c., Chicago. Jobbers quote 2.70c. for plates out of stock.

Cast Iron Pipe.—No big projects are up at the moment, but an active demand for small tonnages is reported. There is no change in prices, either here or at Birmingham. Bids close July 27 on a job at Hinsdale, Ill.

We quote per net ton, f.o.b. Chicago, as follows: Water pipe, 4-in., \$49.70 to \$50.70; 6-in. and above, \$45.70 to \$46.70; class A and gas pipe, \$3 extra.

Structural Material.—The Inland Steel Co. is accepting new business, except that which can be rolled on its small structural mill, with much caution and has no stated price. The Steel Corporation subsidiary still holds to 1.75c., Chicago, but is making no definite delivery promises on new business. The Chicago market appears quotable at 1.75c. to 2c., with the latter figure minimum where specific delivery is required. Structural lettings are more numerous than they have been and include a few of fair size. Jobbers have advanced the price of plain material out of warehouse to 2.70c.

The mill quotation on plain material is 1.75c. to 2c., Chicago. Jobbers quote 2.70c. for plain material out of warehouse.

Rails and Track Supplies.—There is no appreciable decline in the demand for track bolts, spikes, tie plates and angle bars and makers find it difficult to keep abreast of their orders. Not much new business is coming out in rails, but on standard sections, makers cannot make definite deliveries before October. Fairly prompt shipments can be made against new orders for light rails.

Standard Bessemer and open-hearth rails, \$40; light rails rolled from new steel, 1.75c., f.o.b. makers' mills.

Standard railroad spikes, 2.25c. to 2.35c., Pittsburgh; track bolts with square nuts, 3.25c. to 3.35c., Pittsburgh; tie plates, steel and iron, 1.85c. to 2c., f.o.b. mill; angle bars, 2.40c., f.o.b. mill.

Jobbers quote standard spikes out of warehouse at 3.30c. Tie and track bolts 4.30c. base.

Reinforcing Bars.—The Truscon Steel Co. has been awarded 100 tons for the packing plant for Katz &

Horn, St. Paul. Other business done in the past week has involved only small tonnages. Pending business includes the Pine Grove Apartments, Chicago, 275 tons, and an office building for the Atchison, Topeka & Santa Fe Railroad, Newton, Kan., 125 tons.

Coke.—Available tonnages of foundry coke are very limited because of the shortage of coal and the hindrances to deliveries incident to the congestions and the railroad labor troubles. The local product is nominally quoted at \$11.25, Chicago, and that from the South at \$10.75. Not much of the latter is enroute and sales for the moment are nil.

Old Material.—Prices do not change much in this market. We note a slightly weaker tendency in the steel works grades, which are in light demand on account of the uncertainty as to the fuel supply. Compressed sheets are down about 50c. per gross ton. Cast iron borings also are weaker, but the market is stronger on malleable, which is in brisk demand from the malleable foundries and busheling also commands slightly more money this week than it did last week.

We quote delivery in consumers' yards, Chicago and vicinity, all freight and transfer charges paid, as follows:

Per Gross Ton		
Iron rails	.....	\$18.50 to \$19.00
Cast iron car wheels	.....	19.50 to 20.00
Relaying rails	.....	22.50 to 27.50
Rolled or forged steel car wheels	.....	18.50 to 19.00
Steel rails, rerolling	.....	16.25 to 16.75
Steel rails, less than 3 ft.	.....	17.50 to 18.00
Heavy melting steel	.....	15.50 to 16.00
Frogs, switches and guards cut apart	.....	15.50 to 16.00
Shoveling steel	.....	15.00 to 15.50
Drop forge flashings	.....	11.50 to 12.00
Hydraulic compressed sheet	.....	13.00 to 13.50
Axle turnings	.....	13.50 to 14.00
Per Net Ton		
Iron angles and splice bars	.....	17.50 to 18.00
Steel angle bars	.....	14.75 to 15.25
Iron arch bars and transoms	.....	18.00 to 18.50
Iron car axles	.....	22.50 to 23.00
Steel car axles	.....	15.50 to 16.00
No. 1 busheling	.....	12.25 to 12.75
No. 2 busheling	.....	7.00 to 7.50
Cut forge	.....	13.75 to 14.25
Pipes and flues	.....	10.50 to 11.00
No. 1 railroad wrought	.....	14.00 to 14.50
No. 2 railroad wrought	.....	13.75 to 14.25
Steel knuckles and couplers	.....	16.25 to 16.75
Coil springs	.....	16.50 to 17.00
No. 1 machinery cast	.....	17.00 to 17.50
No. 1 railroad cast	.....	16.00 to 16.50
Low phos. punchings	.....	15.00 to 15.50
Locomotive tires, smooth	.....	13.00 to 13.50
Machine shop turnings	.....	8.50 to 9.00
Cast borings	.....	11.25 to 11.75
Stove plate	.....	14.50 to 15.00
Grate bars	.....	13.50 to 14.00
Brake shoes	.....	14.00 to 14.50
Railroad malleable	.....	16.00 to 16.50
Agricultural malleable	.....	16.00 to 16.50

Plans of the Durant Motors Co.

It is announced that the Durant Motors Co. has organized a new company to be known as the Flint Motor Co., Flint, Mich., to manufacture a medium-priced automobile to be known as the Flint. The Durant Motors Co. takes possession this week of the former plant of the Willys Corporation at Elizabeth, N. J., which it recently purchased at public auction, and the plant at Long Island City, which has been used by the Durant company for assembly of the Durant automobile, will soon be utilized as an assembly plant for the Flint Motor Co. It has also been announced within the past few days that W. C. Durant, head of the Durant Motors Co., has been elected president of the Locomobile Co., Bridgeport, Conn., and plans for the expansion of the business of the latter company, which has been in the hands of a receiver, are under way.

A cast iron door, 15 x 16 in. in size, has been developed by the Conveyors Corporation of America, 326 West Madison Street, Chicago. It is designed especially for boiler settings thus to secure tightness against the leakage of air or gases. The bearing surfaces are machined and floating hinges pivoted to the door at the center are used.

New York

Coal and Coke Strikes Responsible for Feverish Condition of Market

NEW YORK, July 25.—The market is demoralized on account of the coal and railroad strikes causing scarcity of pig iron, coal and coke. A very limited tonnage of pig iron can now be obtained and the shortage of coke is causing great embarrassment. British coal and coke may check the rapid advance in prices of fuel. Considerable coal from England is now on the ocean.

Pig Iron.—The market is feverish and prices are rapidly advancing. In eastern Pennsylvania the lowest schedule announced within the past two days was \$27 for No. 2 plain, \$28 for No. 2X and \$29 to \$30 for No. 1X. One of the two companies having any iron to sell has advanced its base from \$28 and is now quoting from \$28 to \$29. Reports from Buffalo indicate that the market is at least \$26 on No. 2 plain and \$26.50 on malleable, with \$28 asked. No Virginia iron is obtainable and quotations on this grade are nominal. The A. P. Smith Mfg. Co., East Orange, is in the market for 450 tons of foundry iron for delivery in the first quarter of next year. There seems to be no probability of quotations being submitted soon for that delivery. A boiler company is in the market for 1000 tons No. 2X for delivery in August and September at its New York plant. A Springfield, Mass., melter is in the market for 1200 to 2200 tons for the remainder of the year. Prices on foreign iron are advancing, usual quotations being \$27 seaboard on Scotch, \$23.50 on French, and \$25 on Middlesbrough.

We quote delivered in the New York district as follows, having added to furnace prices \$2.27 freight from eastern Pennsylvania, \$4.91 from Buffalo and \$5.44 from Virginia:

East, Pa. No. 1 fdy., sil. 2.75 to 3.25.	\$31.77 to \$32.77
East, Pa. No. 2X fdy., sil. 2.25 to 2.75	30.77 to 31.77
East, Pa. No. 2 fdy., sil. 1.75 to 2.25.	29.77 to 30.77
Buffalo, sil. 1.75 to 2.25.	30.91 to 31.91
No. 2 Virginia, sil. 1.75 to 2.25.....	29.44 to 30.44

Ferroalloys.—There is a demand for ferromanganese for prompt shipment, with very little available. Buyers have offered as high as \$72.50 and \$75, seaboard, for spot carloads and a few such sales have been made, resale material being supplied. One British agent with a small consignment due in August has sold several hundred tons at \$67.50, seaboard, while others have gotten \$70 on small lots. No domestic alloy is to be had before September and the coke shortage may affect this delivery. The Sheridan furnace of the Lavington Furnace Co. may be obliged to bank at any time because of lack of coke. Spiegeleisen is unchanged at \$35 for the 16 to 19 per cent and \$36, furnace, for the 19 to 21 per cent. Prices are lower on 50 per cent ferrosilicon. Makers who were quoting \$55, delivered, are now willing to sell at \$52, or possibly less.

Ferromanganese, domestic, seaboard, per ton,	\$67.50 to \$70.00
Ferromanganese, British, seaboard, per ton,	\$67.50 to \$70.00
Spiegeleisen, 17 to 19 per cent.....	\$35.00
Spiegeleisen, 20 per cent.....	\$36.00
Ferrosilicon, 50 per cent, delivered, per ton,	\$52.00 to \$55.00
Ferrotungsten, per lb. of contained metal 40c. to 50c.	
Ferrochromium, 6 to 8 per cent carbon, 60 to 70 per cent Cr. per lb. Cr., delivered.....	12c. to 14c.
Ferrovanadium, per lb. of contained vanadium,	
Ferrocortontitanium, 15 to 18 per cent, 1 ton to carloads, per ton.....	\$200.00
<i>Ores</i>	
Manganese ore, foreign, per unit, seaboard, 25c. to 26c.	
Tungsten ore, per unit, in 60 per cent concentrates, nominal	\$3.00 up
Chrome ore, basis 48 per cent Cr ₂ O ₃ , crude, per unit, Atlantic seaboard.....	40c. to 45c.
Molybdenum ore, 85 per cent concentrates, per lb. of MoS ₂ , New York.....	40c. to 45c.

Finished Iron and Steel.—Fuel shortage, occasioned in no small degree by transportation delays, is the all-important topic. An added number of mills will not consider any fresh business. Those mills which can still promise delivery in a few weeks are quoting premium prices, and even under these conditions do not favor relatively small tonnage orders involving a variety of sizes. More is heard of a repetition of conditions of 1920 in that there has been to some degree considerable duplication of orders. The minimum on heavy ton-

nage products appears still to be 1.70c., Pittsburgh, except to such large consumers as car builders. Round lots of merchant and reinforcing concrete bars have sold at 1.90c., Pittsburgh, under definite delivery promises.

We quote for mill shipments, New York, as follows: Soft steel bars, 2.04c. to 2.14c.; structural shapes, 2.04c. bar iron, 1.94c.; and steel plates, 1.99c. to 2.04c. On export shipments the freight rate from Pittsburgh to New York is 25c. per 100 lb., while the domestic rate is 34c.

High Speed Steel.—Slightly increased activity is reported, but sales are still small. Producers continue to quote 18 per cent tungsten high speed steel at 75c. per lb., with special brands of some companies ranging up to 95c. per lb.

Warehouse Business.—Prices in this district on bars, structural material, hoops, bands and plates and blue annealed sheets have been increased 15c. per 100 lb. Black and galvanized sheets are still on the same schedule of 4.35c. and 5.35c. per lb. respectively, with this schedule very weak. The new price is evidently based upon 1.70c. per lb., base, Pittsburgh, with an effort to keep as close as possible to the \$13 per ton spread that has prevailed for some time. Bars are now 2.73c.; structural material, 2.78c.; plates, 2.78c.; hoops, 3.78c.; bands, 3.38c., and blue annealed sheets, 3.78c. for No. 10 gage. The market continues fairly active, warehouses handling structural material reporting unusually good business in this line. Dealers in wrought iron and steel pipe report prevailing prices strong and very close to the official schedule. We quote prices on page 264.

Cast-Iron Pipe.—Activity in purchasing by both private and municipal interests continues strong, but the pig iron shortage is beginning to be felt. Foundries are still booked up for three to four months. No new municipal tenders or lettings are reported this week. We quote, per net ton, f.o.b. New York, in carload lots, as follows: 6-in. and larger, \$53.50; 4-in. and 5-in., \$58; 3-in., \$63.80, with \$4 additional for Class A and gas pipe.

Coke.—While a sale of 25 cars of coke has been made at \$12, ovens, the market has since advanced rapidly, and it is doubtful whether less than \$14.50 could now be done on Connellsburg coke. By-product coke is quoted at \$12 to regular customers. The advance in foundry coke is due not only to increase in demand, but also to heavy freight rates due to the chartering of vessels for the importation of British coal.

Old Material.—Despite the general quietness in the market, prices on heavy melting steel are particularly stiff. Buying by Buffalo mills has warranted payment on No. 1 heavy melting steel up to as high as \$11. This was on steel being shipped by barge to Buffalo, which takes a freight of only \$2.25 per ton, compared with the railroad freight rate of \$5.17. Higher prices in the Pittsburgh market have also tended to stiffen heavy melting steel. Specification pipe is quotable at \$9 to \$9.50 per ton. Prices being paid on heavy melting steel are now about \$10.25 to \$10.75, and on short length steel rails \$11.25 to \$11.75. Rerolling rails range from \$11.50 to \$12.

Buying prices per gross ton, New York, follow:	
Heavy melting steel, yard.....	\$10.25 to \$10.75
Steel rails, short lengths, or equivalent.....	11.25 to 11.75
Rerolling rails.....	11.50 to 12.00
Relaying rails, nominal.....	27.00 to 28.00
Steel car axles.....	16.00 to 17.00
Iron car axles.....	22.00 to 23.00
No. 1 railroad wrought.....	12.50 to 13.00
Wrought iron track.....	11.00 to 11.50
Forge fire.....	8.00 to 8.50
No. 1 yard wrought, long.....	10.50 to 11.00
Cast borings (clean).....	9.25 to 10.25
Machine-shop turnings.....	9.25 to 10.25
Mixed borings and turnings.....	9.25 to 10.25
Iron and steel pipe (1 in. diam. not under 2 ft. long).....	9.00 to 9.50
Stove plate.....	10.00 to 10.50
Locomotive grate bars.....	11.50 to 12.00
Malleable cast (railroad).....	10.50 to 11.00
Cast-iron car wheels.....	13.00 to 13.50

Prices which dealers in New York and Brooklyn are quoting to local foundries, per gross ton, follow:	
No. 1 machinery cast.....	\$18.00 to \$19.00
No. 1 heavy cast (columns, building materials, etc.), cupola size.....	16.50 to 17.00
No. 1 heavy cast, not cupola size.....	13.00 to 13.50
No. 2 cast (radiators, cast boilers, etc.)	12.00 to 12.50

Philadelphia

Coal and Coke Shortage Is Crux of Present Situation—Prices Higher

PHILADELPHIA, July 25.—Although the Administration at Washington is not relaxing its efforts to bring about a settlement of labor troubles at coal mines and on the railroads, the pig iron and steel trade sees little hope of speedy improvement in the coal and coke supply, which is now being seriously restricted by the inability of railroads to furnish transportation. The first effect has been upon blast furnaces, and in addition to the several in the East which were reported last week as having banked, others have been similarly stopped. The Bethlehem Steel Co. has banked a furnace at Steelton and one at Sparrows Point, also having two banked at Bethlehem, as mentioned last week. The Midvale Steel & Ordnance Co. has banked one at its Johnstown plant and another will probably become idle this week, while the coke situation also threatens the one active Midvale stack at Coatesville. The Eastern Steel Co. has banked its furnace at Pottstown. Other furnaces are short of coke and may be forced to suspend. The Sheridan furnace of the Lavino Furnace Co., making ferromanganese, is in this position. Pig iron prices have been forced upward, the high prices being paid for such coke as is available leaving furnaces with no alternative but to ask more for their product.

In steel the situation is not yet so acute, but of course it will become so as soon as the effect of reduced pig iron output has spread to other departments. At present the situation is being helped out at some plants by stocks of cold steel on hand. Some steel companies are wholly or partly out of the market. The sources of supply for finished steel for prompt delivery are becoming fewer.

Pig Iron.—With the Warwick furnace banked on account of coke shortage, the Wharton furnace of the Reogle Steel Co. out of the market, the Bethlehem Steel Co. having no iron available for prompt delivery except some stock iron of off analysis, and other furnaces not anxious to sell in view of the possibility that they, too, may soon be affected by coke shortage, the present Eastern pig iron situation is not hopeful either from the buyer's or seller's point of view. The minimum at which foundry iron is now obtainable is \$27 for No. 2 plain, \$28 for No. 2X and \$30 for No. 1X, f.o.b. furnace, with the sellers restricting their sales largely to regular customers. Fortunately for consumers, they appear to have their present needs covered and there is very little inquiry, but there is considerable pressure for deliveries on contracts.

The following quotations are, with the exception of those on low phosphorus iron, for delivery at Philadelphia, and include freight rates varying from 76 cents to \$1.64 per gross ton:

East. Pa. No. 2 plain, 1.75 to 2.25 sll.	\$27.76
East. Pa. No. 2X, 2.25 to 2.75.....	28.76
East. Pa. No. 1X.....	30.76
Virginia No. 2 plain, 1.75 to 2.25 sll.	\$29.17 to 30.17
Virginia No. 2X, 2.25 to 2.75 sll.....	30.17 to 31.17
Basic delivery eastern Pa.....	25.75 to 26.75
Gray forge.....	25.50 to 26.00
Malleable.....	27.50 to 28.00
Standard low phosph. (f.o.b. furnace).....	30.00
Copper bearing low phosph. (f.o.b. furnace).....	30.00

Ferroalloys.—A few carloads of resale ferromanganese for prompt shipment have been sold at \$72.50 and \$75, seaboard, the buyers in one or two instances making the offers. Very little ferromanganese from abroad is available for August delivery, most of the British agents offering nothing earlier than September. For forward delivery \$67.50, seaboard, is still quoted by domestic and British producers, but the buyer must pay whatever tariff may be legislated.

Semi-Finished Steel.—Open-hearth rerolling billets are quoted at \$35, Pittsburgh, and forging billets at \$40, Pittsburgh. There are few sales.

Plates.—With few mills offering plates for prompt shipment, the situation has become much tighter and price no longer is an important factor when consumers' needs are pressing. For prompt delivery 1.80c.,

Pittsburgh, is easily obtainable, and it is doubtful whether the average buyer can do much better, though the Pennsylvania Railroad, on 5000 tons of car repair material bought a few days ago, is said to have been quoted less than 2c., Eastern mills. The plate mills are harassed by diminishing coal reserves and receipts are so low that the effect of the shortage will soon be reflected in decreased operations.

Structural Material.—Although plain material is obtainable at 1.70c., Pittsburgh, the sources of supply at this price are narrowing. Probably not more than one or two Eastern mills will now accept orders for early shipment at 1.70c. In some instances, higher prices are being paid. An office building for Albert M. Greenfield, to be built at Chestnut and Fifteenth streets, requiring 2500 tons, is in the market.

Bars.—There is a scarcity of steel bars for prompt delivery at regular market prices. One Buffalo mill is quoting 2c., Pittsburgh. Another leading producer, which has been quoting 1.80c., Pittsburgh, is now out of the market. Some Eastern makers of bar iron have advanced their prices to 1.80c., Pittsburgh, for carload lots. One large producer is still quoting 1.60c., but may advance to 1.70c. this week.

Warehouse Business.—Local jobbers have advanced prices on nearly all items. Demands upon the warehouses for steel have increased since the railroad situation has made shipments more difficult. We now quote for local delivery out of stock as follows:

Soft steel bars and small shapes, 2.70c.; iron bars (except bands), 2.70c.; round edge iron, 2.90c.; round edge steel, iron finish, 1 1/2 x 1 1/2 in., 2.90c.; round edge steel planished, 3.65c.; tank steel plates, 1/4-in. and heavier, 2.80c.; tank steel plates, 3/16-in., 3c.; blue annealed steel sheets, No. 10 gage, 3.40c.; black sheets, No. 28 gage, 4.25c.; galvanized sheets, No. 28 gage, 5.25c.; square twisted and deformed steel bars, 2.80c.; structural shapes, 2.80c.; diamond pattern plates, 1/4-in., 4.50c.; 3/16-in., 4.50c.; spring steel, 3.50c.; round cold-rolled steel, 3.35c.; squares and hexagons, cold-rolled steel, 3.70c.; steel hoops, No. 13 gage and lighter, 3.75c.; steel bands, No. 12 gage to 3/16-in., inclusive, 3.35c.; iron bands, 3.90c.; rails, 2.70c.; tool steel, 8c.; Norway iron, 5.50c.

Old Material.—There is very little activity in eastern Pennsylvania and such demands as exist for steel scrap come from the Pittsburgh district. Johnstown, Pa., has paid \$16 for No. 1 steel and \$16.50 for railroad steel. A Pittsburgh mill is offering \$17.50. There has been a little demand for No. 1 railroad wrought and cast iron borings for chemical plants, with prices advancing. We quote for delivery at consumers' works in this district as follows:

We quote for delivery at consuming points in this district as follows:

No. 1 heavy melting steel.....	\$15.00 to \$15.50
Scrap rails.....	15.00 to 15.50
Steel rails, rerolling.....	17.00 to 17.50
No. 1 low phos., heavy 0.04 and under.....	22.00 to 24.00
Cast iron car wheels.....	17.50 to 18.50
No. 1 railroad wrought.....	17.50 to 18.50
No. 1 yard wrought.....	15.00 to 15.50
No. 1 forge fire.....	13.00 to 13.50
Bundled sheets (for steel works).....	13.00 to 13.50
No. 1 busheling.....	12.50 to 13.00
No. 2 busheling.....	10.00 to 11.00
Turnings (short shoveling grade for blast furnace use).....	13.00 to 13.50
Mixed borings and turnings (for blast furnace use).....	13.00 to 13.50
Machine-shop turnings (for steel works use).....	13.00 to 13.50
Machine-shop turnings (for rolling mill use).....	13.50 to 14.00
Heavy axle turnings (or equivalent).....	14.00 to 14.50
Cast borings (for steel works and rolling mills).....	14.00 to 14.50
Cast borings (for chemical plants).....	17.00 to 17.50
No. 1 cast.....	17.50 to 19.50
Railroad grate bars.....	14.50 to 15.00
Stove plate (for steel plant use).....	15.00 to 15.50
Railroad malleable.....	15.00 to 15.50
Wrought iron and soft steel pipes and tubes (new specifications).....	13.00 to 13.25
Shafting.....	20.00 to 20.50

Competitive examinations for engineering positions in the Interstate Commerce Commission and for an aeronautic engineer in the Navy Yard, Washington, are announced by the United States Civil Service Commission. Applicants should ask for blank 1312, stating that it is desired to take the examination for senior engineer, grade 2, in the one case and assistant aeronautic engineer in the other.

Cleveland

Pig Iron Advanced \$2 to \$3—Strikes More Seriously Felt

CLEVELAND, July 25.—The effects of the coal shortage due largely to the railroad shopmen's strike are being more seriously felt every day by blast furnaces and steel works in this district. While coal shipments from the Kentucky and West Virginia fields improved slightly during the week, stocks of some consumers are about exhausted and there has been some further curtailment in plant operations. M. A. Hanna & Co. have blown out their Cherry Valley furnace. Another Ohio furnace is scheduled to be banked in a few days, and the continued operation of one or two others is very uncertain. The McKinney Steel Co. has shut down three more open-hearth furnaces, and is now operating but seven out of 14.

Iron Ore.—Ore shipments by Northern railroads from the mines to the docks, which were cut down as a result of the shopmen's strike, have improved. The slowing down was due to lack of motive power, but some of the roads have been able to secure men for locomotive repair work. However, the situation is still bad on the Great Northern Railroad. The ore market is at a standstill. One inquiry for approximately 100,000 tons is pending, but very little activity is expected before the strike situation clears up. Boats are getting good despatch owing to the fact that having no coal cargoes they are going up the lake light and it is expected that the July movement will be close to 10,000,000 tons. The situation has not as yet compelled the tying up of any boats, although this may become necessary.

We quote delivered lower lake ports: Old range Bessemer, 55 per cent iron, \$5.95; Old range non-Bessemer, 51 1/2 per cent iron, \$5.20; Mesabi Bessemer, 55 per cent iron, \$5.70; Mesabi non-Bessemer, 51 1/2 per cent iron, \$5.05.

Ore Statistics.—Ore on hand at furnaces and Lake Erie docks, July 1, amounted to 25,367,087 tons, as compared with 30,066,465 tons on the same date a year ago. Furnace stocks July 1 amounted to 18,693,088 tons. During June there was consumed 3,388,027 tons of lake ore as compared with 3,293,964 tons during May.

Pig Iron.—Pig iron has advanced \$2 to \$3 per ton on foundry and malleable grades owing to the growing scarcity due to the shutting down of some furnaces and the withdrawal of other producers from the market. Three lake furnaces entirely stopped selling iron during the week because of the uncertainty as to future operations due to the fuel shortage and there is apparently only one producer in the northern Ohio and Valley districts that has any iron to offer at present. A Cleveland steel maker has purchased 5000 tons of basic iron from a local producer at \$25 Valley, but it is doubtful whether any more could be had at that price. A West Virginia consumer has an inquiry out for 3000 tons of basic. Considerable inquiry for foundry iron came out during the week on which several producers declined to quote. Others booked several thousand tons. A local furnace sold several lots of foundry iron up to 1000 tons at \$25 and then advanced its minimum price to \$26 and its next quotation may be \$27. Sales include a small lot of foundry iron at \$26.50. A local furnace sold 400 tons for shipment to the Pittsburgh district at \$26. Another lake furnace sold considerable foundry iron at \$25 to \$26. Sales of malleable iron have been made at \$27. The minimum price on foundry iron in Buffalo and Detroit is now \$26. A small lot of southern Ohio iron is available at \$25. Southern iron is unchanged at \$18.50. Shipments of Alabama iron have become very slow on account of the railroad situation and much of this iron is being routed in a roundabout way for Ohio delivery instead of through Cincinnati.

Quotations below are f.o.b. local furnace for Northern foundry iron, not including a 50c. switching charge. Other quotations except basic and low phosphorus are delivered Cleveland, being based on a \$3.02 rate from Jackson and a \$6 rate from Birmingham:

Basic, Valley furnace.....	\$25.00
Northern No. 2 fdy., sil. 1.75 to 2.25.....	\$26.00 to 26.50
Southern fdy., sil. 1.75 to 2.25.....	24.50
Ohio silvery, sil. 8 per cent.....	33.52
Standard low phos., Valley furnace..	33.00

Semi-Finished Steel.—The leading Cleveland producers sold several lots of sheet bars, billets and slabs during the week at \$35. There is considerable inquiry for forging billets in car lots. An Eastern mill is quoting these at \$40 at mill, or about \$43, Pittsburgh.

Finished Iron and Steel.—There is considerable inquiry for steel, but several mills are not taking on additional business because of their well-filled order books and the uncertainty about future operation. Consequently consumers are having difficulty in placing orders. Special forging steel and nut steel are scarcer than other items. New demand is largely for steel for early shipment and buyers seem willing to pay premium prices to secure quick deliveries. A local bolt and nut manufacturer paid 1.80c. for 200 tons of steel bars, that being the lowest price available for early shipment. Cleveland and some Valley district mills are quoting tank plates at 2c. to 2 10c. Some sales are reported at the lower price and orders have been booked at the higher price for quick shipment. On light plates 2.10c. is fairly common. There is an increase in demand for plates from boiler manufacturers. Considerable new work continues to develop in the building field.

Reinforcing Bars.—The demand for reinforcing bars continues heavy and some of the mills are getting behind on deliveries. Quotations on hard steel bars range from 1.75c. to 1.80c. The Concrete Steel Co. has taken 220 tons for the Louisville Gas & Electric Co., Louisville, Ky., 190 tons for a service building for the Vahey Oil Co., Youngstown, Ohio, and 130 tons for highway work near Dayton, Ohio. The Franklin Steel Co. has taken 230 tons for the West Seventy-third Street bridge, Cleveland. The general contract for the Roosevelt School, Dayton, Ohio, has been placed with the Wallbridge-Aldinger Co., Dayton.

Sheets.—Specifications continue heavy, but only a moderate amount of new business is coming out. The price situation seems somewhat eas'er in that several mills are quoting the American Sheet & Tin Plate Co. prices without delivery promises. However, there is considerable irregularity in the market and some mills are getting \$3 per ton above the Steel Corporation's prices. One jobber reports car lot sales of galvanized sheets for mill shipment at 4.25c.

Cast-Iron Pipe.—Cleveland will receive bids July 28 for 1625 tons of 24 to 60-in. cast-iron pipe and for 155 tons of fittings for the water works department.

Warehouse Business.—Warehouse prices on steel bars, plates and structural material, hoops and bands, and blue annealed sheets have been advanced \$3 per ton. Warehouse sales show an increase over June.

Jobbers quote steel bars, 2.56c.; plates and structural shapes, 2.66c.; No. 9 galvanized wire, 3c.; No. 9 annealed wire, 2.50c.; No. 28 black sheets, 4c.; No. 28 galvanized sheets, 5c.; No. 10 blue annealed sheets, 3.50c. to 3.61c.; hoops and bands, 3.21c.; cold-rolled rounds, 3.30c.; flats, squares and hexagons, 3.80c.

Bolts, Nuts and Rivets.—Specifications on bolt and nut contracts are heavy and include good orders from the railroads in spite of the shopmen's strike. The market is firmer and there is less disposition than recently among some makers to shade regular quotations. The leading local rivet manufacturer Monday advanced prices \$5 per ton on structural and boiler rivets and has discontinued making contracts. The price advance and refusal to make further commitments is due to the inability to place additional orders for steel for early requirements, except at premium prices, and to uncertainty about future steel prices. It is understood that other manufacturers will make similar advances. Structural rivets are now quoted at 2.65c. and boiler rivets at 2.75c. Small rivets have advanced, 70 per cent off list now being the general quotation and 70 and 5 per cent off list the extreme discount.

Coke.—The coke situation has become more acute. Considerable new inquiry is coming out for foundry coke, but practically none is available. Very little of

the Virginia coke recently sold to Ohio consumers is coming through to its destination because of the railroad situation. The last sale of Connellsburg foundry coke was at \$13. We note the sale of ten cars of Indianapolis by-product foundry coke at \$10 to a Cleveland consumer. One Virginia interest is still booking orders from its regular foundry customers at \$7.

Old Material.—Owing to the uncertainty as to future mill operations because of the fuel situation and the resulting absence of demand, there has been a further softening in scrap prices of about 25c. a ton on both steel making and blast furnace grades. Mills generally are taking material on contracts, but are declining to buy for future requirements. Dealers are making little attempt to do any business. Small lot purchases of heavy melting steel by dealers to cover old orders are reported at \$14.75.

We quote per gross ton, f.o.b. Cleveland, as follows:

Heavy melting steel	\$14.75 to \$15.00
Steel rails, under 3 ft	15.25 to 15.50
Steel rails, rerolling	15.75 to 16.25
Iron rails	14.00 to 15.00
Iron car axles	18.00 to 19.00
Low phosphorus melting	16.00 to 16.25
Cast borings	12.25 to 12.50
Machine shop turnings	11.50 to 12.00
Mixed borings and short turnings	12.00 to 12.50
Compressed steel	12.85 to 13.25
Railroad wrought	14.00 to 14.50
Railroad malleable	15.50 to 16.00
Light bundled sheet stampings	10.00 to 10.25
Steel axle turnings	13.00 to 13.50
No. 1 cast	17.00 to 17.50
No. 1 busheling	10.50 to 10.75
Drop forge flashings over 10 in.	10.50 to 10.75
Drop forge flashings under 10 in.	10.50 to 10.75
Railroad grade bars	13.75 to 14.25
Stove plate	13.75 to 14.25
Pipes and flues	10.00 to 11.00

Birmingham

BIRMINGHAM, ALA., July 25.

Pig Iron.—Although little business was done outside of the bookings by one large foundry interest in the St. Louis, Cincinnati and Chicago markets, and the placing of a large tonnage by a pipe maker, the Birmingham iron base at the close of the third week of the month seemed nearer \$19 to \$20 than \$18.50 to \$20, the large maker, retiring from a former \$18 minimum, also retiring from a later \$18.50 minimum. Sales of recent occurrence have included 1000 tons to a pipe maker, lots of 2000 and 4000 booked in Chicago territory, lots of 300 and 400 tons to Kansas City and St. Louis and 760 tons to a Louisville melter. It is also understood that the United States Cast Iron Pipe & Foundry Co. has bought 20,000 tons, paying base of \$18.50. Reports of extremely large tonnages booked by pipe concerns are a rehash of news published in June. Withdrawal of the large maker quoting \$18.50 from that base is accepted as indicating the end of that price. One maker holding for \$20 for fourth quarter is selling third quarter at \$19 and that is about the base for that business for such as can be had. Rather more pipe iron for fourth quarter delivery appears to have been taken than was estimated. However, there is no hurry in that quarter. Neither steel mill nor furnace operations had been affected from production standpoint by the railroad strike up to the close of the week and this week's operations were likewise assured of non-interruption. The leading interest has not lost a turn of a wheel in any department. Where one company is short on full coal supply there is ample coke on hand. Deliveries are handicapped.

We quote per gross ton f.o.b. Birmingham district furnaces as follows:

Foundry, silicon 1.75 to 2.25	\$18.50 to \$20.00
Basic	18.50 to 19.00
Charcoal, warm blast	30.00 to 32.00

Finishing Mills.—The strike has not interfered with steel mill operations. The Tennessee company is continuing its double turn in finishing mills. The Gulf States Steel Co. and American Steel & Wire Co. are at full turn. The Conners Steel Co. is busy on cotton ties and has trouble in deliveries. The Southern Pacific's order for 35,000 tons of rails to be rolled at Ensley is for 1923 delivery.

Cast Iron Pipe.—The United States Cast Iron Pipe & Foundry Co. booked 10,000 ft. of 24-in. pipe for Wil-

mington, N. C., following 12 miles of 16-in. for Hendersville and 6½ miles for Morgantown, N. C., and numerous other Southern bookings. Belated customers are placing orders even when delivery is not promised under 90 to 120 days. The base is \$37 and \$38 can be had in many instances for the asking. Sanitary pipe continues to sell at \$65 for standard and \$60 for extra heavy. Coast movements are continuously heavy.

Coal and Coke.—The rail strike has upset the coal field nearly 50 per cent, especially on the Southern Railway, while other roads, especially the Louisville & Nashville, are doing much better. In one instance motor trucks are moving coal from mines to Illinois Central cars. Spot coal base has moved up to \$3.

Old Material.—Steel scrap has become active with numerous buyers. In some instances it has sold as low as \$11, but general quotations are unchanged.

We quote per gross ton f.o.b. Birmingham district yards as follows:

Steel rails	\$13.00 to \$15.00
No. 1 steel	12.00 to 14.00
No. 1 cast	15.00 to 16.00
Car wheels	14.00 to 15.00
Tramcar wheels	13.00 to 14.00
Stove plate	13.00 to 14.00
Cast iron borings	6.00 to 7.00
Machine shop turnings	4.00 to 5.00

St. Louis

ST. LOUIS, July 25.

Pig Iron.—The market for pig iron continues strong. Prices are unchanged at \$24.50, Chicago, for deferred shipment and \$25 for prompt shipment for Northern iron, and \$18.50 to \$20, Birmingham, for the Southern product. The increasing difficulties besetting makers of pig iron through the shortage of coal and its steadily mounting prices are expected to cause further advances in the price of iron. The principal inquiries are for high-silicon iron, of which there is a scarcity, the local maker being entirely out of these grades. Buying for the week was confined largely to lots of a carload up to 300 tons, although not of any great volume. The Sheffield maker quoting the lowest price for Southern iron did only a small business during the week. The melt in the district still is heavy, and melters are asking for quick shipments of orders already placed. A Des Moines, Iowa, melter is in the market for from 1000 to 1500 tons of foundry iron, and an Indiana concern wants 1000 to 1500 tons of malleable. A concern in the district wants several hundred tons of ferromanganese; otherwise the ferroalloy markets are quiet. As the Southern Railroad and the Louisville & Nashville have not yet filed with the Interstate Commerce Commission their proposed rate of \$4.22 from Birmingham to St. Louis, we are using the \$5.17 rate announced July 1.

We quote delivered consumers' yards, St. Louis, as follows, having added to furnace prices \$2.16 freight from Chicago and \$5.17 from Birmingham and 81 cents average switching charge from Granite City:

Northern foundry, sil. 1.75 to 2.25 (third quar.)	\$26.66
Northern malleable, sil. 1.75 to 2.25 (third quar.)	26.56
Basic (third quar.)	26.56
Southern foundry, all rail, sil. 1.75 to 2.25	24.48
Southern foundry, water and rail, sil. 1.75 to 2.25, f.o.b. St. Louis	22.17

Finished Iron and Steel.—Local fabricators have had some difficulty in placing orders for from 50 to 100 tons, as the shortage of coal and heavy orders have put some of the largest concerns out of the market altogether, while others are declining most business submitted to them. The steel for the Missouri, Kansas & Texas Railway shops at Denison, Texas, amounting to 350 tons, has been let to the Mississippi Valley Structural Steel Co. Local concerns are interested in the building of the American Can Co., New Orleans, Favrot & Livaudais, architects, involving a considerable tonnage of reinforcing bars and a small amount of structural steel. The Missouri, Kansas & Texas Railway purchased 2500 kegs of standard track spikes, dividing the order among several concerns. Other railroad inquiries

were for small quantities, items that should come from warehouses.

For stock out of warehouse we quote: Soft steel bars, 2.57½c. per lb.; iron bars, 2.57½c.; structural shapes, 2.67½c.; tank plates, 2.67½c.; No. 10 blue annealed sheets, 3.72½c.; No. 28 black sheets, cold rolled, one pass, 4.45c.; cold drawn rounds, shafting and screw stock, 3.50c.; structural rivets, \$3.19½ per 100 lb.; boiler rivets, \$3.29½; tank rivets, 7/16 in. and smaller, 60 per cent off list; machine bolts, large, 50 and 10 per cent; small, 50-10 and 10 per cent; carriage bolts, large, 55-5 per cent; small, 60 and 10 per cent; lag screws, 60 per cent; hot pressed nuts, square or hexagon blank, \$3.50; and tapped, \$3.25 off list.

Coke.—An avalanche of orders for coke has swept down on everyone in the trade here. Orders have come in exceedingly heavy volume not only from the industries, but from the coal trade as well. The St. Louis by-product producers are out of the market. The Granite City producers have taken on a very big tonnage. Their plant is at full capacity, but orders exceed that and they have been drawing on their storage stocks. In addition to the business that has resulted as a result of the coal strike and other concerns being out of the market, coke on gas contracts is being supplied. The price of coke is steadily mounting on account of the abnormal cost of coal, its scarcity and rising prices. At mines where there is coal to be had, its movement is hampered by the railroad strike. Connellsville coke is most difficult to get. Some Alabama coke is being shipped in here.

Old Material.—The old material market continues to show strength, and most items are higher. Very little material is moving on account of the railroad strike, and it is difficult to get cars in which to make shipments. There are no railroad offerings, as the roads are without the labor to handle old material. The demand for rolling mill grades is good, a little going out of the district.

We quote dealers' prices f.o.b. consumers' works, St. Louis industrial district and dealers' yards, as follows:

Per Gross Ton

Old iron rails.....	\$16.75 to \$17.25
Steel rails, rerolling.....	15.75 to 16.25
Steel rails, less than 3 ft.....	16.25 to 16.75
Relaying rails, standard section.....	25.00 to 28.00
Cast iron car wheels.....	18.25 to 18.75
No. 1 heavy railroad melting steel.....	14.75 to 15.25
No. 1 heavy shoveling steel.....	13.75 to 14.25
Ordinary shoveling steel.....	13.75 to 14.25
Frogs, switches and guards, cut apart	15.25 to 15.75

Per Net Ton

Heavy axle and tire turnings.....	9.50 to 10.00
Steel angle bars.....	13.75 to 14.25
Iron car axles.....	23.50 to 24.00
Steel car axles.....	17.00 to 17.50
Wrought iron bars and transoms.....	19.00 to 19.50
No. 1 railroad wrought.....	13.50 to 14.00
No. 2 railroad wrought.....	13.00 to 13.50
Railroad springs.....	16.00 to 16.50
Steel couplers and knuckles.....	16.25 to 16.75
Cast iron borings.....	9.00 to 9.50
No. 1 busheling.....	11.75 to 12.25
No. 1 railroad cast.....	15.50 to 16.00
Stove plate and light cast.....	12.75 to 13.25
Railroad malleable.....	14.00 to 14.50
Pipes and flues.....	8.75 to 9.25
Machine shop turnings.....	9.25 to 9.75

Buffalo

BUFFALO, July 25.

Pig Iron.—The situation in the pig iron industry here is most serious and practically all the furnaces see the end of operations on the basis of their present coke commitments. Although no furnaces have been banked, two interests have curtailed their blast in an effort to extend operations for a longer period. The rail situation has precipitated what is close to a crisis, in the sense that where furnaces were able to get some supplies of coke, deliveries have been delayed and the likelihood that stacks will be banked looms closer. Rogers, Brown & Co. are out of the market. While they have had little iron available for some weeks, the statement is now made that absolutely none is for sale. For No. 2 foundry \$26 appears to be the price on the few sales that have been made, and \$27 has been done on malleable where a small tonnage was concerned. No big sales have been made, and inquiry has been rather quiet with all sellers.

We quote f.o.b. per gross ton Buffalo as follows:

No. 1 foundry, 2.75 to 3.25 sif.....	\$27.00
No. 2X foundry, 2.25 to 2.75 sif.....	26.50
No. 2 plain, 1.75 to 2.25 sif.....	26.00
Basic.....	25.00
Malleable.....	26.50
Lake Superior charcoal.....	31.78

Finished Iron and Steel.—All the producers of this section are in a serious condition, and none is able to forecast just how long operations will continue. The local branch of an independent has received orders to withdraw from the market on all products, although it was able to take only limited tonnages of bars and shapes. Inquiry is brisk for all materials. Reduced operations have had the effect of further delaying deliveries. The independent referred to was quoting 1.70c. on bars before it formally withdrew. A local bar maker is understood to have booked 1000 tons at 1.80c. with delivery in six to eight weeks. One interest is able to take pipe business in a limited way, but only from its established trade and these tonnages are booked for 60 to 90 days deliveries. Intimations from the trade have been that an advance in pipe prices could be expected. One company is understood to be quoting 2c. on bars. An advance is expected in sheet prices by one local factor, but no announcement is to be made, at least for the present. Sheet inquiry is good, but the tonnages are not especially big. No maker of finished material has more than from two to three weeks supply of fuel ahead.

Warehouse Business.—Effective July 20, prices have advanced. Business is especially brisk in bars and structural materials, and is good in all lines. With the curtailment of mill operations a greater volume of business is reaching all warehouses.

We quote warehouse prices Buffalo, as follows: Structural shapes, 2.85c.; plates, 2.85c.; soft steel bars, 2.75c.; hoops, 3.55c.; bands, 3.40c.; blue annealed sheets, No. 10 gage, 3.80c.; galvanized steel sheets, No. 28 gage, 5.60c.; black sheets, No. 28, 4.60c.; cold rolled round shafting, 3.55c.

Old Material.—The railroad shop strike is beginning to have a serious effect on the scrap market, and while prices are firm, mills are not especially anxious to buy the last few days. The strike is interfering with the movement of cars and deliveries are going to be delayed with scrap recently purchased from railroads. There have been no big sales and dealers expect none until the fuel situation is relieved in some manner.

We quote dealers' asking prices per gross ton f.o.b. Buffalo as follows:

Heavy melting steel.....	\$16.75 to \$17.00
Low phosph., 0.04 and under.....	18.00 to 19.00
No. 1 railroad wrought.....	16.00 to 16.50
Car wheels.....	17.00 to 18.00
Machine shop turnings.....	10.50 to 11.00
Cast iron borings.....	14.00 to 14.50
Heavy axle turnings.....	14.00 to 14.50
Grate bars.....	14.00 to 14.50
No. 1 busheling.....	15.00 to 15.50
Stove plate.....	15.00 to 15.50
Bundled sheet stampings.....	11.50 to 12.00
No. 1 machinery cast.....	18.00 to 18.50
Hydraulic compressed.....	15.00 to 15.50
Railroad malleable.....	17.00 to 17.50

Boston

BOSTON, July 25.

Pig Iron.—The largest individual sale reported in this territory the past week is 500 tons No. 1 foundry lake charcoal iron at \$28.50 furnace base, to an eastern Massachusetts melter. Business otherwise ranged from car lots to 150 tons, mostly Buffalo at \$25.50 furnace for silicon 2.25 to 2.75 and \$26.50 to \$26.75 for silicon 2.75 to 3.25. Eastern and western Pennsylvania, Virginia, Alabama and foreign iron sales were made on base prices previously reported. Aggregate sales of all kinds of iron fell considerably short of 3000 tons. A Springfield, Mass., melter is inquiring on 500 to 1000 tons of silicon 2.25 to 2.75, 500 to 1000 tons of silicon 2.75 to 3.25, and 250 tons of silicon 4.50 to 5.50, last quarter shipment. In the last two or three days, numerous small inquiries from foundries not receiving contract iron ordered heretofore have come into the market. A Buffalo furnace has again withdrawn from the market, thereby complicating the third quarter shipment market, inasmuch as brokers have few other domestic irons to offer. It is expected prices will advance within the next ten days on the strength of emergency inquiries. More or less foreign iron, mostly Scotch and English, is offered at August and later deliveries. Prices range from around \$26, upward, c.i.f. Boston and other Atlantic seaboard points, depending on the urgency of the foundry's needs. New England

foundries, so far, however, have not manifested much interest in foreign irons.

We quote delivered at common New England points as follows, having added to furnace prices \$3.65 freight from western Pennsylvania, \$4.91 from Buffalo, \$5.92 from Virginia and \$9.60 from Alabama:

East, Penn., sll. 2.25 to 2.75.....	\$30.15 to \$30.65
East, Penn., sll. 1.75 to 2.25.....	29.65 to 30.15
Buffalo, sll. 2.25 to 2.75.....	29.91 to 30.41
Buffalo, sll. 1.75 to 2.25.....	29.41 to 29.91
Alabama, sll. 2.25 to 2.75.....	28.60 to 30.10
Alabama, sll. 1.75 to 2.25.....	28.10 to 29.60

Warehouse Business.—The following advances have been made, per 100 lb., in local warehouse prices: toe cork steel, \$1; steel bands 6 in. wide x $\frac{1}{8}$ in. thick, 72c., and 3 1/16 in. thick, 57c.; plain round and square concrete bars, 25c.; 3/16 in. thick plates, 16 1/2c.; soft steel bars, flats, deformed bars, structural steel, tire steel, hoop steel, half rounds, ovals and bevels, and refined iron, 15c. Sheets, open-hearth and crucible spring steel, cold rolled steel, best refined iron, Wayne and Norway iron remain as heretofore. The movement of iron and steel out of warehouses has no more than held its own. Stocks are in better shape, however, because of recent arrivals from mills. Steel bands appear to be in shorter supply than other products. Bolts and nuts are moving in average quantities for this time of the year. Large rivets are in slightly better demand.

Jobbers quote: Soft steel bars, \$2.75 1/2 per 100 lb. base; flats, \$3.40 1/2; concrete bars, \$2.90 to \$3.03; structural steel, \$2.75 1/2 to \$2.90 1/2; tire steel, \$4.15 to \$4.50; open-hearth spring steel, \$4.50 to \$6; crucible spring steel, \$11.50; steel bands, \$3.90; hoop steel, \$4.40; cold rolled steel, \$3.50 to \$4; refined iron, \$2.75 1/2; best refined iron, \$4.25; Wayne iron, \$5.50; Norway iron, \$6 to \$6.50; plates, \$2.85 1/2 to \$3.04; No. 10 blue annealed sheets, \$3.75 per 100 lb. base; No. 28 black sheets, \$4.90; No. 28 galvanized sheets, \$5.90.

Old Material.—Pennsylvania mills have withdrawn from the New England old material market as a result of the coal and railroad labor situations. The trade here takes this action to mean that mills either have all the old material needed or expect reduced operations. The local market for heavy melting steel, pipe, bundled skeleton, etc., therefore, was flat the past week. Prices on mixed borings and turnings are 50c. to \$1 a ton lower, according to the material, due to a lack of buying orders and increased offerings. Quotations otherwise remain unchanged. A small demand remains for cast iron borings suitable for chemical purposes at \$11.50 to \$12 f.o.b. cars shipping point, but material is lacking because of the inactivity of textile machinery making plants. New England foundries continue to supply themselves with machinery cast from local or nearby yards. Boston dealers find this kind of competition difficult to overcome. Sales of car lots therefore are few and far between.

The following prices are for gross ton lots delivered consuming points:

No. 1 machinery cast.....	\$19.00 to \$20.00
No. 2 machinery cast.....	17.00 to 18.00
Stove plate.....	14.00 to 14.50
Railroad malleable.....	15.00 to 15.50
Street car wheels.....	18.00 to 19.00

The following prices are offered per gross ton lots f.o.b. Boston rate shipping points:

No. 1 heavy melting steel.....	\$11.00 to \$11.50
No. 1 railroad wrought.....	11.50 to 12.00
No. 1 yard wrought.....	10.00 to 10.50
Wrought pipe (1 in. in diam. over 2 ft. long).....	8.00 to 8.50
Machine shop turnings.....	8.50 to 9.00
Cast iron borings, rolling mill.....	9.50 to 10.00
Cast iron borings, chemical.....	10.50 to 12.00
Blast furnace borings and turnings.....	8.50 to 9.00
Forged scrap and bundled skeleton.....	8.00 to 8.50
Street car axles and shafting.....	14.50 to 15.00
Rerolling rails.....	11.00 to 11.50

Coke.—New England producers of by-product foundry coke are quoting spot fuel at \$14.50 to \$15, delivered, where the local freight does not exceed \$3.10, and have advanced contract coke from \$13.50 to \$15.50, delivered. The contract price now is equal to \$12.40 per ton at oven, or \$5.65 a ton above the low price quoted this year and \$4.89 a ton above the oven price a year ago. The producers also have advanced crushed coke \$1 a ton, making the spot price \$13 f.o.b. ovens and the contract \$12, while \$13.50 is charged on tonnages delivered outside of New England. Producers are experiencing considerable difficulty in maintaining adequate high volatile coal for mixture purposes in producing coke. Foundries, fearful of deferred deliveries, due to railroad labor troubles, are making heavy de-

mands on coke producers. A Connecticut brass manufacturer during the past week closed on 1000 tons of crushed coke on a basis of \$14.25, Boston.

Cincinnati

CINCINNATI, July 25.

Pig Iron.—The market this week shows little life, and while the price situation is a little stronger, actual transactions are few and far between. The melters appear to have taken the attitude that it would be practically useless to buy iron while the coal and rail strikes are on, as they feel that with the interruption of railroad traffic they would stand little chance of getting iron should they come into the market. With present conditions continuing there is bound to be a scarcity of iron. Several furnaces now operating in the Ironton-Ashland district are on the ragged edge for coke and unless coal is moved to the ovens will shut down. Sales during the week included a number of 100-ton lots, with three totaling 500 each reported. A central Ohio melter bought 500 tons of malleable at a reported price of \$25.50, southern Ohio furnace, and another district melter 500 tons of foundry at \$18.50, Southern furnace. A southern Ohio melter took 500 tons of Southern foundry for fourth quarter shipment on an \$18.50 Birmingham, base, on Northern irons. With the exception of a lake furnace, which is reported to have booked an order for 300 tons at \$23, prices are up from 50c. to \$1 a ton. Ironton producers are now quoting a minimum of \$24.50 Ironton, and Chicago district stacks are quoting \$25. In the South \$18.50 appears to be the minimum, as the low priced seller was booking orders at this figure last week. There is some resale Southern available at \$18, but the tonnage is reported to be rather light. The only inquiry of consequence is from northern Ohio for 300 tons of foundry for immediate shipments.

Based on freight rates of \$4.05 from Birmingham and \$2.27 from Ironton, we quote f.o.b. Cincinnati:

Southern coke, sll. 1.75 to 2.25 (base).....	\$22.55
Southern coke, sll. 2.25 to 2.75 (No. 2 soft).....	23.05
Ohio silvery, 8 per cent.....	34.77
Southern Ohio coke, sll. 1.75 to 2.25 (No. 2).....	26.77
Basic Northern.....	27.27
Malleable.....	26.77

Plant Operations.—The rail and coal strikes, while causing some inconvenience to mills in this district, have not as yet seriously interfered with operations. Blast furnaces operating in southern Ohio are still being supplied with coke by their connections, and while the outlook is not at all bright, it is hoped that something may develop shortly that will enable them to keep running. Most of the steel plants in this district receive their coal supplies through river shipments, and are therefore in a good position to keep operating regardless of a railroad tie-up. Delay in railroad transportation is the only thing that will necessitate shutdowns.

Finished Material.—A number of independent steel companies have withdrawn from the market, owing to their inability to make deliveries, and will bend every effort to take care of orders now on their books. The demand for finished materials is rather quiet, due to the general upset caused by the rail and coal strikes. Consumers are urging the mills to make shipments, and are bending every effort to get materials in before the congestion becomes more serious. Prices have an advancing tendency, but it appears to be the policy of the mills to prevent, if possible, a runaway market. On bars, shapes and plates, the ruling quotations are 1.70c. to 1.80c., the higher figure being named for early delivery, while the lower price generally refers to orders booked for shipment at mills' convenience. We note an order for 400 tons of bars booked by an independent company during the week at 1.80c., Pittsburgh, with no definite delivery asked. Inquiries for plates from car equipment companies are coming to the front. A Middle West car builder, which recently booked an order for 1000 cars, and which has also taken on a large order for car repair work, is understood to have placed a sizable tonnage of plates with the leading interest. An Eastern mill is quoting plates in this district at 2.10c., Pittsburgh, but the ruling price is generally

1.70c. On sheets demand for automobile body stock continues heavy, seconds commanding the same price as primes. The market generally can be quoted at a range from 4.50c. to 4.85c. Black, galvanized and blue annealed sheets are in fair demand, prices ranging from 3.15c. to 3.40c. for black, 4.15c. to 4.30c. for galvanized, and 2.40c. to 2.50c. for blue annealed. Wire products are showing more activity, due undoubtedly to the desire on the part of jobbers to round out their stocks before the railroad situation becomes acute. Inquiries for pipe are fairly numerous, with mills quoting three months' delivery. In the structural field no new inquiries of size have come out, and the number of awards fell off considerably. A number of projects on which bids have been taken have been deferred for the time being.

Warehouse Business.—Local jobbers of iron and steel products report a heavy demand for immediate shipment, a local warehouse booking an order for 125 tons of small angles for shipment out of stock. Prices, following similar announcements from the Pittsburgh district, have been advanced \$3 per ton on most products. Sheets are moving in better volume, and bolts and nuts are also picking up.

Jobbers quote: Iron and steel bars, 2.75c. base; hoops, 3.60c.; bands, 3.35c. base; shapes and plates, 2.85c. base; reinforcing bars, 2.82 1/2c. base; cold-rolled rounds, 3.35c. base; flats, squares and hexagons, 3.85c. base; No. 10 blue annealed sheets, 3.60c.; No. 28 black sheets, 4.50c.; No. 28 galvanized sheets, 5.50c.; No. 9 annealed wire, \$2.70 per 100 lb.; common wire nails, \$2.85 per keg, base.

Tool Steel.—The demand for tool steel shows a slight falling off, due entirely to the unsettled condition caused by the coal and rail strikes. Operations at some local manufacturing plants are being interfered with to a slight extent, and the outlook for the immediate future is not encouraging. Prices are unchanged, 18 per cent tungsten high speed steel being quoted at 75c. per lb. base.

Coke.—There is a heavy demand for coke for prompt shipment and prices are rising rapidly. Connellsville foundry coke is quoted at \$14, New River at \$8.50 to \$11, Wise County at \$9.50 to \$10, ovens, and by-product fuel at \$9, Connellsville basis. Transportation is being seriously interfered with, but coke producers report that railroads are still accepting cars for shipment subject to delay. To date there has been little interference with foundry operations, but this week will likely see a number of plants shut down on account of coke shortage.

Old Material.—There is little more activity in the scrap market, all transactions being for delivery within the next 30 days. Steel and cast are in better demand. Some mills have asked dealers to withhold shipments until the transportation question is settled one way or another. Prices, while having a softer tendency, remain unchanged.

We quote dealers' buying prices, f.o.b. cars Cincinnati:

Per Gross Ton			
Bundled sheets	\$8.00 to	\$8.50	
Iron rails	13.50 to	14.00	
Relaying rails, 50 lb. and up	26.50 to	27.00	
Rerolling steel rails	13.50 to	14.00	
Heavy melting steel	13.00 to	13.50	
Steel rails for melting	13.00 to	13.50	
Car wheels	14.50 to	15.00	
Per Net Ton			
No. 1 railroad wrought	11.50 to	12.00	
Cast borings	9.00 to	9.50	
Steel turnings	8.00 to	8.50	
Railroad cast	14.00 to	14.50	
No. 1 machinery	16.00 to	16.50	
Burnt scrap	9.50 to	10.00	
Iron axles	18.00 to	18.50	
Locomotive tires (smooth inside)	11.00 to	11.50	
Pipes and flues	6.50 to	7.00	

Freight Rates on Pig Iron from Birmingham

As the Louisville and Nashville and Southern railroads notified Birmingham iron makers July 10 that the rate on pig iron from Birmingham to Cincinnati would be \$3.53 and the rate from Birmingham to St. Louis \$4.22, THE IRON AGE, in its issues of July 13 and

July 20, published those as the prevailing rates, instead of the rates of \$4.05 to Cincinnati and \$5.17 to St. Louis, which became effective July 1, succeeding the rates of \$4.50 to Cincinnati and \$5.70 to St. Louis. On Monday of this week the railroads made the following announcement:

Effective Sept. 1, rates on pig iron from Birmingham and intermediate points to St. Louis and other places taking the St. Louis rate will be reduced 26.48 per cent from the rates in effect June 29. Rates from Birmingham to Cincinnati, Louisville, Evansville and other crossing points will be reduced 21.55 per cent from the rates in effect June 29. Rates to Cleveland, Chicago and other points in Central Freight Association territory will remain unchanged, as northern roads would not come into agreement.

Hence THE IRON AGE this week quotes the rates which became effective July 1, namely, \$4.05 from Birmingham to Cincinnati and \$5.17 from Birmingham to St. Louis.

More Metal Workers at Higher Wages

Iron and steel plants, according to figures of the Bureau of Labor Statistics, show for June a gain over May of 7256 employees in 106 establishments. This gain of 5.3 per cent was accompanied by a gain of 6.7 per cent in amount of payroll and a corresponding gain in the average pay envelope from \$46.77 to \$47.41, or 1.3 per cent.

In the automobile industry the gain in 44 establishments was 22 per cent in number of employees and 7.7 per cent in payroll total. In car building and repairing there was a gain of 6.9 per cent in number of employees in 61 establishments, and a gain of 10.6 per cent in amount of payroll.

Wages in car building and repairing, due to the continuance of war time wages in railroad repair shops, are considerably higher than in the steel industry. The excess in June over steel mill wages was 26.5 per cent and that in May was over 24 per cent. Wages in automobile plants, which are exceptionally busy, were 52.7 per cent over those prevailing in steel plants, and not so much as in May when the excess was 59 per cent. Details are shown in the table.

Period	Number of Establishments	Number of Men	Half-Month Payroll	Average Pay Envelope
<i>Iron and Steel</i>				
May, 1922.....	106	137,170	\$6,415,178	\$46.77
June, 1922.....	106	144,426	6,847,174	47.41
June, 1921.....	110	110,572	4,907,968	44.38
<i>Automobiles*</i>				
May, 1922.....	44	100,800	7,257,400	72.00
June, 1922.....	44	108,012	7,818,566	72.39
June, 1921.....	44	94,729	6,635,553	70.95
<i>Car Building and Repairing</i>				
May, 1922.....	61	54,258	3,147,877	58.01
June, 1922.....	61	58,025	3,481,629	60.00
June, 1921.....	61	44,462	3,057,619	68.77

*Payroll figures are reported as "weekly"; they have been made "half-monthly" by multiplying by 2 1/6.

In referring, on page 1717, June 15, to the una-flow steam engine, it should have been stated that the steam flows from the ends of the cylinder toward a common central exhaust, instead of from the center toward the ends. This uni-directional flow of the steam causes a gradual fall of temperature in the cylinder walls from inlet to exhaust, while the long compression, in combination with jacketing of the heads, raises the temperature of the clearance surfaces to a point above that of the entering steam, thus eliminating cylinder condensation.

A manual on corporation law, accounting and finance, entitled, "Corporation Procedure," is about to be issued by the Ronald Press Co., 20 Vesey Street, New York, under the authorship of Thomas Conyngton, R. J. Bennett, Hugh R. Conyngton and Paul W. Pinkerton. The book is intended to serve as a guide to corporation officials and accountants as well as to lawyers, bankers and investors.

Prices Finished Iron and Steel, f.o.b. Pittsburgh

Plates

Sheared, tank quality, base, per lb. 1.70c. to 1.80c.

Structural Material

Beams, channels, etc. 1.70c. to 1.80c.

Iron and Steel Bars

Soft steel bars, base, per lb. 1.70c. to 1.80c.

Reinforced iron bars, base per lb. 2.20c.

Hot-Rolled Flats

Hoops, base, per lb. 2.50c. to 2.75c.

Bands, base, per lb. 2.50c. to 2.75c.

Strips, base, per lb. 2.50c. to 2.75c.

Cotton ties, per bundle of 45 lb. \$1.10

Cold-Finished Steels

Bars and shafting, base, per lb. 2.10c.

Strips, base, per lb. 4.00c.

Wire Products

Nails, base, per keg. \$2.40

Bright plain wire, base, per 100 lb. 2.25

Annealed fence wire, base, per 100 lb. 2.25

Galvanized wire, base, per 100 lb. 2.75

Galvanized barbed, base, per 100 lb. 3.05 to 3.15

Galvanized staples, base, per keg. 3.05 to 3.15

Painted barbed wire, base, per 100 lb. 2.55 to 2.65

Polished staples, base, per keg. 2.55 to 2.65

Cement coated nails, base, per count keg. 1.90 to 2.00

Woven fence, carloads. 73 per cent off list

Bolts and Nuts

Machine bolts, small, rolled threads. 60, 10 and 10 per cent off list

Machine bolts, small, cut threads. 60 and 10 per cent off list

Machine bolts, larger and longer. 60 and 10 per cent off list

Carriage bolts, $\frac{3}{8}$ x 6 in.

Smaller and shorter, rolled threads. 60 and 10 per cent off list

Cut threads. 60 per cent off list

Longer and larger sizes. 60 per cent off list

Lag bolts. 60, 10 and 10 per cent off list

Plow bolts, Nos. 1, 2 and 3 heads. 50 and 10 per cent off list

Other style heads. 20 per cent extra

Machine bolts, c.p.c. and t. nuts, $\frac{3}{8}$ x 4 in.

Smaller and shorter. 50 and 10 per cent off list

Larger and longer sizes. 50 and 10 per cent off list

Hot pressed square or hex. blank nuts. \$4.50 off list

Hot pressed nuts, tapped. \$4.50 off list

C.p.c. and t. sq. or hex. nuts, blank. \$4.50 off list

C.p.c. and t. sq. or hex. nuts, tapped. \$4.50 off list

Seam-finished hex. nuts:

$\frac{9}{16}$ in. and smaller, U. S. S. 80 and 10 per cent off list

$\frac{5}{8}$ in. and larger, U. S. S. 75 and 10 and 10 per cent off list

Small sizes, S. A. E. 80, 10 and 10 per cent off list

S. A. E. $\frac{5}{8}$ in. and larger. 75 and 10 and 10 per cent off list

Stove bolts in packages. 80 and 5 per cent off list

Stove bolts in bulk. 80, 5 and 2 $\frac{1}{2}$ per cent off list

Tire bolts. 65 per cent off list

Track bolts in carloads. 3.00c. to 3.25c. base

Track bolts, less than 200 kegs. 3.50c. to 3.75c. base

Cap and Set Screws

Milled square and hex. head cap screws. 75 and 10 per cent off list

Milled set screws. 75 per cent off list

Upset cap screws. 80 per cent off list

Upset set screws. 80 and 5 per cent off list

Rivets

Large structural and ship rivets, base, per 100 lb. \$2.65

Large boiler rivets, base, per 100 lb. 2.75

Small rivets. 70 to 70 and 5 per cent off list

Track Equipment

Spikes, $\frac{9}{16}$ in. and larger, base, per 100 lb. \$2.25 to \$2.35

Spikes, $\frac{1}{2}$ in. and smaller, base, per 100 lb. 2.50 to 2.60

Spikes, boat and barge, base, per 100 lb. 2.50 to 2.60

Track bolts, base, per 100 lb. 3.25

Tie plates, per 100 lb. 2.00 to 2.25

Angle bars, base, per 100 lb. 2.40

Freight Rates

All rail freight rates from Pittsburgh on finished iron and steel products, in carload lots, to points named, per 100 lb., are as follows:

Philadelphia, domestic. \$0.325

Philadelphia, export. 0.265

Baltimore, domestic. 0.315

Baltimore, export. 0.255

New York, domestic. 0.34

New York, export. 0.285

Boston, domestic. 0.365

Boston, export. 0.285

Buffalo. \$0.265

Cleveland. 0.215

Cleveland, Youngstown.

Comb. 0.19

Detroit. 0.295

Cincinnati. 0.295

Indianapolis. 0.31

Chicago. 0.34

St. Louis.

Kansas City.

Kansas City (pipe).

St. Paul.

Omaha.

Omaha (pipe).

Denver.

Denver (pipe).

Pacific Coast.

Pac. Coast, ship plates.

Birmingham.

Memphis.

Jacksonville, all rail.

Jacksonville, rail and

water.

New Orleans.

2.40c. to 2.60c.

3.15c. to 4.40c.

4.15c. to 4.40c.

3.15c. to 3.40c.

Manufacturers have pamphlets, which can be had upon

application, giving price differentials for gage and extras for

length, width, shearing, etc.

The minimum carload to most of the foregoing points is 36,000 lb. To Denver the minimum loading is 40,000 lb., while to

the Pacific Coast on all iron and steel products, except structural material, the minimum is 80,000 lb. On the latter item

the rate applies to a minimum of 50,000 lb., and there is an extra charge of 9c. per 100 lb. on carloads of a minimum of

40,000 lb. On shipments of wrought iron and steel pipe to Kansas City, St. Paul, Omaha, and Denver the minimum carload

is 40,000 lb. On iron and steel items not noted above the rates vary somewhat and are given in detail in the regular rail-

road tariffs.

Rates from Atlantic Coast ports (i.e., New York, Philadelphia and Baltimore) to Pacific Coast ports of call on most steam-

ship lines, via the Panama Canal, are as follows: Pig iron, 30c. to 40c.; ship plates, 30c. to 40c.; ingot and muck bars,

structural steel, common wire products, including cut or wire nails, spikes and wire hoops, 30c. to 40c.; sheets and tin plates,

50c.; rods, wire rope, cable and strands, 75c.; wire fencing, netting and stretcher, 50c.; pipe, not over 8 in. in diameter, 50c.;

over 8 in. in diameter, 2 $\frac{1}{2}$ c. per in. or fraction thereof additional. All prices per 100 lb. in carload lots, minimum 40,000 lb.

Welded Pipe

Butt Weld

Steel

Iron

Inches	Black	Galv.	Inches	Black	Galv.
$\frac{1}{8}$	54 $\frac{1}{2}$	28	$\frac{1}{4}$ to $\frac{3}{8}$	3 $\frac{1}{2}$	18 $\frac{1}{2}$
$\frac{1}{4}$ to $\frac{3}{8}$	60	33 $\frac{1}{2}$	$\frac{1}{2}$ to $\frac{5}{8}$	36 $\frac{1}{2}$	23 $\frac{1}{2}$
$\frac{3}{8}$	65	50 $\frac{1}{2}$	$\frac{5}{8}$	42 $\frac{1}{2}$	27 $\frac{1}{2}$
$\frac{5}{8}$	69	56 $\frac{1}{2}$	1 to 1 $\frac{1}{2}$	44 $\frac{1}{2}$	29 $\frac{1}{2}$
1 to 3	71	58 $\frac{1}{2}$			

Lap Weld

Steel

Iron

Inches	Black	Galv.	Inches	Black	Galv.
2	64	51 $\frac{1}{2}$	2	39 $\frac{1}{2}$	25 $\frac{1}{2}$
$\frac{5}{8}$ to 6	68	55 $\frac{1}{2}$	$\frac{1}{2}$ to 6	42 $\frac{1}{2}$	29 $\frac{1}{2}$
7 to 8	65	51 $\frac{1}{2}$	7 to 12	40 $\frac{1}{2}$	27 $\frac{1}{2}$
9 to 12	64	50 $\frac{1}{2}$			

Butt Weld, extra strong, plain ends

Steel

Iron

Inches	Black	Galv.	Inches	Black	Galv.
$\frac{1}{8}$	50 $\frac{1}{2}$	33	$\frac{1}{4}$ to $\frac{3}{8}$	4 $\frac{1}{2}$	+37 $\frac{1}{2}$
$\frac{1}{4}$ to $\frac{3}{8}$	56	38 $\frac{1}{2}$	$\frac{1}{2}$ to $\frac{5}{8}$	35 $\frac{1}{2}$	23 $\frac{1}{2}$
$\frac{3}{8}$	62	50 $\frac{1}{2}$	$\frac{5}{8}$	42 $\frac{1}{2}$	28 $\frac{1}{2}$
$\frac{5}{8}$	67	55 $\frac{1}{2}$	1 to 1 $\frac{1}{2}$	44 $\frac{1}{2}$	30 $\frac{1}{2}$
1 to 1 $\frac{1}{2}$	69	57 $\frac{1}{2}$			
2 to 3	70	58 $\frac{1}{2}$			

Lap Weld, extra strong, plain ends

Steel

Iron

Inches	Black	Galv.	Inches	Black	Galv.
2	62	50 $\frac{1}{2}$	2	40 $\frac{1}{2}$	27 $\frac{1}{2}$
$\frac{5}{8}$ to 4	66	54 $\frac{1}{2}$	$\frac{1}{2}$ to 4	43 $\frac{1}{2}$	31 $\frac{1}{2}$
4 $\frac{1}{2}$ to 6	65	53 $\frac{1}{2}$	4 $\frac{1}{2}$ to 6	42 $\frac{1}{2}$	30 $\frac{1}{2}$
7 to 8	61	47 $\frac{1}{2}$	7 to 8	35 $\frac{1}{2}$	23 $\frac{1}{2}$
9 to 12	55	41 $\frac{1}{2}$	9 to 12	30 $\frac{1}{2}$	18 $\frac{1}{2}$

To the large jobbing trade the above discounts are increased by one point, with supplementary discounts of 5 and 2 $\frac{1}{2}$ per cent.

To large buyers of steel tubes a supplementary discount of 5 per cent is allowed.

Boiler Tubes

Lap Welded Steel

Charcoal Iron

1 $\frac{1}{4}$ in.	26 $\frac{1}{2}$	1 $\frac{1}{2}$ in.	5
2 to 2 $\frac{1}{4}$ in.	41	1 $\frac{1}{4}$ to 1 $\frac{1}{2}$ in.	15
2 $\frac{1}{2}$ to 3 in.	52	2 to 2 $\frac{1}{4}$ in.	25
3 $\frac{1}{4}$ to 13 in.	57	2 $\frac{1}{2}$ to 3 in.	30

1 $\frac{1}{2}$ in.	5

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NON-FERROUS METALS

The Week's Prices

July	Lake	Cents Per Pound for Early Delivery		Lead		Zinc		
		Copper, New York		Straits		New York		St. Louis
		Electro-	Tin	New	New	St.	New	Louis
19	14.00	13.75	31.62 1/2	5.75	5.45	6.15	5.80	
20	14.00	13.75	31.75	5.75	5.42 1/2	6.20	5.85	
21	14.00	13.75	31.87 1/2	5.75	5.40	6.25	5.90	
22	14.00	13.75	32.00	5.75	5.40	6.25	5.90	
24	14.00	13.75	32.00	5.75	5.40	6.30	5.95	
25	14.00	13.75	32.12 1/2	5.75	5.40	6.30	5.95	

*Refinery quotation.

New York

NEW YORK, July 25.

Copper is quiet, but prices are fairly well sustained. There is very little activity in tin, but prices have shown a slightly upward trend. Lead is quiet, the St. Louis price being slightly easier. A steady demand for zinc, with small stocks available, continues to force prices upward.

Copper.—The copper market is quiet, but prices are fairly steady. Leading producers are unwilling to sell for any position or for delivery to any point at less than 14c., delivered, for electrolytic, but copper held by second hands has been sold at a fraction under this price, but apparently nothing less than 13.87 1/2c., delivered, has been done. The coal and railroad strikes are having at least a sentimental effect upon buying, although so far no actual distress due to coal shortage is reported from plants of the principal copper consumers. The leading copper producers believe that the market is now in fairly strong position, surplus stocks having practically been exhausted, and that larger buying and higher prices will follow the settlement of the coal and railroad labor troubles.

Tin.—There has been just enough business in tin during the past week to establish price levels. Buyers appear to be well supplied for the present and the trade expects present quiet conditions to prevail until the end of the coal and railroad strikes. Most of the large consumers are covered for the next 60 days. Nevertheless the market is firm and prices, as established by sales, have shown a slightly upward tendency during the week, sales to-day having been made at 5c. above the price of Tuesday, July 18. Sales during the week have amounted to a few hundred tons only, being mostly for September-October shipment to arrive here in November and December. It was reported but not confirmed that sales at 32c. per lb. for future shipment had been made. To-day's London cables report spot standard quoted there at £158 5s.; future standard at £158 7s. 6d.; spot Straits, £159 5s., while the Singapore price is £160 10s.

Lead.—There is some pressure to sell and fairly substantial lots have been disposed of, mostly by one company, at slightly easier prices at St. Louis, although the New York price has remained unchanged at 5.75c. per lb. The St. Louis sales were made, it is stated, at as low as 5.37 1/2c. per lb. Business is spotty.

Zinc.—Declining stocks and a fairly well-sustained demand are the factors influencing an upward trend in zinc prices. The minimum now appears to be 5.95c., St. Louis, while a few sales are said to have been made at 6c., St. Louis. Production is not increasing and probably will not until the coal and railroad strikes are out of the way, and it is expected that this month will bring about a still further reduction in available stocks.

Antimony.—High prices are being asked for antimony, holders now quoting 5.25c. per lb. for carload lots, duty paid, New York. The market continues to be influenced by prospective tariff legislation.

Aluminum.—The price of the Aluminum Co. of America is unchanged at 19.10c. per lb., f.o.b. cars at producer's plant, freight allowed, for the 98-99 per cent virgin metal. Imported aluminum in the outside market is being offered at 17.75c. to 18c. for the same grade.

Old Metals.—The market during the past week was inclined to be sluggish, but values generally showed little change. Dealers' selling prices are as follows:

	Cents Per Lb.
Copper, heavy and crucible.....	13.50
Copper, heavy and wire.....	12.75
Copper, light and bottoms.....	11.00
Heavy machine composition.....	10.50
Brass, heavy	8.00
Brass, light	6.50
No. 1 red brass or composition turnings.....	8.75
No. 1' yellow rod brass turnings.....	7.50
Lead, heavy	4.875
Lead, tea	3.75
Zinc	3.50

Chicago

JULY 25.—Lead has declined slightly, but good advances have been recorded in tin and spelter prices. The advance in tin seems to be largely in sympathy with the London market, through which considerable business recently is reported to have passed. There is a large inquiry for spelter and although the year began with reserve stocks of considerable proportions the report now is that supplies are meager. Copper is unchanged and old metals prices also are holding at the levels of a week ago. We quote, in carload lots, lake copper 14.12 1/2c.; tin, 30.33 1/2c.; lead, 5.45c.; spelter, 6c.; antimony, 7c.; in less than carload lots. On old metals we quote copper wire, crucible shapes and copper clips, 10.75c.; copper bottoms, 9c.; red brass, 8.50c.; yellow brass, 6.75c.; lead pipe, 4.25c.; zinc, 2.75c.; pewter, No. 1, 20c.; tin foil, 22.50c.; block tin, 26c., all buying prices for less than carload lots.

St. Louis

JULY 25.—The lead market for the week was a little easier, 5.35c. to 5.40c., carlots, against 5.45c. last week, while slab zinc was firmer at 5.80c. to 5.90c. On old metals we quote light brass 3.50c.; heavy red brass and light copper, 7c.; heavy yellow brass, 4c.; heavy copper and copper wire, 7.50c.; zinc, 2c.; lead, 3c.; pewter, 15c.; tin foil, 16c.; tea lead, 2c., and aluminum 9c.

Plant Operations in the Youngstown District

YOUNGSTOWN, Ohio, July 25.—Industrial coal consumers say that coal prices are prohibitive, and there is no use to buy, as shipments cannot get through.

District plants of the Carnegie Steel Co. at Youngstown and McDonald are maintaining operations. Five of six furnaces are in blast at the Ohio Works, 14 open hearth furnaces are melting, the Bessemer converter is blowing, while bar mill capacity is engaged at about 80 per cent.

The Youngstown Sheet & Tube Co. reports that it is operating four blast furnaces in its East Youngstown group, 11 open-hearth furnaces, Bessemer department, two blooming mills, four skelp mills, one bar mill, 10 tube and 13 to 14 sheet mills, with rod, wire and conduit capacity active.

At its Youngstown plant, the Republic Iron & Steel Co. has one furnace in blast, 11 open hearths charged, two skelp, one bar, one plate, five tube mills and 16 sheet mills. The output of its plate mill is devoted to skelp.

The Brier Hill Steel Co. has two blast furnaces active, 11 open hearths, blooming and bar mills, 84-in. plate mill and 28 sheet mills scheduled.

Schedules of the Trumbull Steel Co. call for the operation of all seven units in its open-hearth department, bar rolling equipment, three strip mills and 44 sheet and tin plate mills at its Trumbull and Liberty plants.

The Sharon Steel Hoop Co. has one blast furnace pouring, six open hearths charged, and it is operating six sheet mills and four strip mills.

Shortage of sheet bars has not yet curtailed production by non-integrated sheet producers, such as the Newton Steel Co., Falcon Steel Co. and the Mahoning Valley Steel Co., which are operating close to a normal basis.

Proposed Steel Mergers Are Not Illegal

(Continued from page 210)

observed that the Bethlehem specializes in the production of structural shapes.

Rails—Standard: The Lackawanna's great specialty is the production of steel rails. Of the entire tonnage produced in the United States in 1920 (2,604,116), it contributed 15.18 per cent; the Bethlehem, 6.78 per cent. If these companies combine they will, if the ratio just mentioned continues, control substantially 22 per cent of the country's entire production. About seven-eighths of this production is sold in the United States, the remaining one-eighth being sold in the foreign trade. Of the entire amount sold by these two companies in the New England district, the Bethlehem contributed 16.37 per cent; the Lackawanna 83.63 per cent. In the Eastern district, the Bethlehem contributed 38.69 per cent; the Lackawanna 61.31 per cent. In the Western district, the Bethlehem contributed 4.73 per cent; the Lackawanna, 95.27 per cent. In the Southern district the Bethlehem contributed 67.08 per cent; the Lackawanna, 32.92 per cent. Neither company shipped any into the Pacific Coast district.

My investigation of this matter, conducted by representatives in the field, convinces me that in the New England district these two companies enjoy a very substantial amount of the trade in rails. As already indicated, no figures are available showing what other manufacturers ship there. But representatives of practically every railroad in this district were interviewed, all of whom corroborate the statement just made. This in a great measure, if not entirely, is attributable to the fact that the Lackawanna's plant at Buffalo and the Bethlehem's plant in eastern Pennsylvania lie closest to that field.

With respect to rails a marked uniformity, of long duration, exists in quoting prices. All manufacturers of steel rails throughout the country, no matter where the plants may be located, quote substantially the same prices; and the prices thus quoted are uniformly f.o.b. at the mills. Naturally, therefore, it is the railroad's advantage to place its orders with those mills reached by its own rails; or if no mills are located on its line then with those mills off its line that afford the shortest haul. In the former case it incurs no transportation charge; in the latter, such charges are reduced to a minimum. None of the railroad representatives in the New England district (where alone the Bethlehem and Lackawanna enjoy almost an exclusive field in the rail line), voiced any apprehension that a merger of these companies would result in an enhancement of prices or a monopolistic control.

Rails—Light Tees: These constitute a comparatively unimportant item. In 1920 the Bethlehem produced in the domestic trade 2191 tons; the Lackawanna, 14,416 tons. Only 14 tons were sold by both companies in the New England district. Of the 2191 tons shipped by the Bethlehem 1550 were sold in Pennsylvania and 484 in West Virginia, leaving only 157 tons for distribution elsewhere. The Lackawanna, on the other hand, disposed in Pennsylvania, New York and Ohio of nearly all it produced.

Rail accessories:

(a) Standard splice bars: In the New England district the Bethlehem sold 2701 tons; the Lackawanna, 711 tons. In the Eastern district the Bethlehem sold 8389 tons; the Lackawanna 10,975 tons. Of the latter tonnage the Lackawanna marketed over two-thirds in the State of New York. In the Western district the Bethlehem marketed 1554 tons; the Lackawanna, 3066 tons. In the Southern district the Bethlehem marketed 2405 tons; the Lackawanna, 95 tons. In the Pacific Coast district the Bethlehem marketed 29 tons; the Lackawanna, less than a ton.

(b) Bonzano joints: This is a patented product. The Bethlehem produced 3825 tons; the Lackawanna, 510 tons; both companies selling to a single purchaser.

(c) Continuous and 100 per cent joints: This also is a patented product sold by both companies to a

single purchaser, the Bethlehem selling 21,643 tons; the Lackawanna, 4320.

(d) Tie plates—standard: The Bethlehem sold direct to customers 3633 tons; the Lackawanna, 1370 tons, all of which went to a single concern.

These rail accessories constituted but 2.34 per cent of the Bethlehem's domestic business in its steel works division; and but 2.67 per cent of the Lackawanna's domestic business.

Railroad spikes and track bolts: In the New England district the Bethlehem sold 833 tons; the Lackawanna, 544 tons. In the Eastern district the Bethlehem sold 5602 tons; the Lackawanna, 4626 tons. In the Western district the ratio between the two was about the same, although the volume of sales was considerably less. In the Southern district the Bethlehem sold 4570 tons; the Lackawanna, only 591. The sales in the Pacific Coast district were so small as to deserve no mention.

Bridges, Viaducts, Caissons and Buildings.

No figures are available showing the entire amount of business done throughout the country in this line of activity; and it was not until the beginning of this year that the Lackawanna entered upon the construction of viaducts and bridges. It has had nothing to do with caisson construction for upward of three years, although just now it is engaged in carrying out a contract for the tunneling of the Hudson River. With respect to viaducts and bridges the Lackawanna is not equipped to carry on work of the larger kind, its main work being confined to railroad bridges and the like. On the other hand, the Bethlehem's equipment is such as to enable it to construct viaducts and bridges of whatever size. It makes no active effort, however, to acquire the smaller business, such as the Lackawanna engages in, for on the whole it finds it advantageous to keep away as much as possible from work of the smaller kind.

The principal concerns engaged in the fabrication of structural material on a large scale are the following, although there is a large number of smaller fabricators not included in this list whose combined capacity is very substantial:

American Bridge Co., a subsidiary of U. S. Steel Corporation; Belmont Iron Works; Berlin Construction Co.; Bethlehem Fabricators, Inc.; Boston Bridge Works; Buffalo Structural Steel Co.; Eastern Bridge & Structural Co.; Erie Steel Construction Co.; Fort Pitt Bridge Co.; Hay Foundry & Iron Works; Hedden Iron Construction Co.; Jones & Laughlin Steel Co.; George A. Jast Co.; Kansas City Structural Co.; Kellogg Structural Steel Co.; King Bridge Co.; Lehigh Structural Steel Co.; Levgar Structural Co.; McClintic-Marshall Co.; Minneapolis Steel & Machinery Co.; Mt. Vernon Bridge Co.; National Bridge Works; New England Structural Co.; Paterson Bridge Co.; Penn Bridge Co.; Phoenix Iron Co.; Pittsburgh Des Moines Co.; Shoemaker Satterthwaite Co.; Virginia Bridge & Iron Co.; Witherow Steel Co.

The percentage of the principal products produced by other manufacturers and the competition that will exist if this merger goes through.

Pig iron: The total production in the United States in 1920 was 36,925,987 tons, of which the Bethlehem and the Lackawanna together contributed 7.56 per cent. The amount produced by others was 34,137,290 tons, or 92.44 per cent.

Structural Shapes: The entire production in the United States for 1920 was 3,306,748 tons. Of this tonnage, Bethlehem and Lackawanna together contributed 21.43 per cent. Or, to state the matter in a different way, 2,757,929 tons, or 78.57 per cent of the whole, were produced by other concerns. The Iron and Steel Works Directory of the United States and Canada for 1920 gives, on page 470, a list of 52 different concerns engaged in the manufacture of structural shapes in the United States.

Plates: 4,755,133 tons were produced in the United States in 1920; the Bethlehem and the Lackawanna together contributed 4.73 per cent. This means that 4,529,986 tons, representing 95.27 per cent of the total, were produced by other concerns. See pp. 472-3 of the Directory just mentioned for a list of 58 concerns in the United States manufacturing plates in 1920.

Rails: The total production in the United States in

1920 amounted to 2,604,116 tons, of which Bethlehem and Lackawanna together contributed 21.96 per cent. Or, to state the matter in a different way, 2,032,231 tons, representing 78.04 per cent of the total, were produced by others. See p. 469 of the Directory for a list of the various concerns in the United States engaged in the manufacture of rails.

Steel Ingots: Inasmuch as all steel products are made from this article, it will be well to give figures showing the ingot capacity of the entire country and the percentage represented by Bethlehem and Lackawanna, with figures designed to contrast their capacity with that of the United States Steel Corporation and other producers. The country's total rated annual ingot capacity is 50,440,000 tons. Of this amount Bethlehem and Lackawanna's combined capacity is 9.7 per cent; that of the United States Steel Corporation is 45 per cent; that of all others is 45.3 per cent. In other words, the rated ingot capacity of the United States Steel Corporation is about five times that of the Bethlehem and Lackawanna combined.

Will a merger of these companies violate the act of July 2, 1890, commonly known as the anti-trust act?

In my opinion it will not. I am unable to find any ground for asserting that the acquisition of the Lackawanna by the Bethlehem will offend the Act of July 2, 1890, commonly known as the Sherman or anti-trust act. The numerous decisions of the supreme Court, ranging over a period of 30 years, leave little room for doubt as to the true scope and meaning of this important statute. Every combination formed for the avowed purpose of restraining interstate trade or of acquiring a monopoly therein falls, of course, within its condemnation. As pointed out in an early decision of the Supreme Court,¹ it is not every contract or combination in restraint of trade that is prohibited by this act; for if that were the case, scarcely any contract would fall beyond its reach. It obviously applies, however, to every contract or combination in unreasonable restraint of trade; and manifestly the evils that may be inflicted upon the public, such as the enhancement of prices, are of paramount concern.

I am unable, however, to find in the exhaustive investigation I have made any reasonable warrant for asserting that the public will suffer if this consolidation is consummated. I am persuaded that the motive which prompts the Bethlehem to acquire the Lackawanna plant is the sole desire to secure greater efficiency and economy in the production, handling, and distribution of steel products, and that the thought of acquiring a monopoly or of enhancing prices was never present. The whole transaction from beginning to end impresses me as being thoroughly clean, honest and straightforward. I need not stop to point out that in *United States v. U. S. Steel Corporation*, 251 U. S. 417, the Supreme Court refused to declare illegal a combination of much greater magnitude. In that case the court apparently adopted the findings of two of the four judges of the lower court that the combination there assailed was formed for the avowed purpose of acquiring a monopoly; but because monopoly was found to be impossible of attainment and all attempts with other manufacturers to control prices had been abandoned in good faith before suit was brought, the court refused to order the combination dissolved. The merger now under consideration will be neither an actual monopoly nor even an attempt to monopolize; and of course the decision just referred to is controlling.

Will a merger of these companies violate the act of October 15, 1914, commonly known as the Clayton Act?

Here also I am constrained to the conclusion that it will not. But different considerations in part apply. That act (Sec. 7) makes it illegal for one corporation engaged in interstate commerce to acquire the stock or other share capital of another corporation engaged also

¹ *Hopkins v. United States*, 171 U. S. 578, 600. "The act must have a reasonable construction or else there would scarcely be an agreement or contract among business men that could not be said to have indirectly or remotely some bearing upon interstate commerce, and possibly to restrain it."

in such commerce where the effect of such acquisition may be substantially to lessen competition between them or to restrain commerce in any section or community, or tend to create a monopoly of any line of commerce. It is obvious that the acquisition of the stock of one company by another is not prohibited where all that takes place is a mere lessening of competition. The act denounces the acquisition only where the effect may be substantially to lessen competition between the companies. I have set forth with considerable detail the extent of the competition existing between the two companies mentioned. In my opinion the facts are not such as to bring the proposed merger within the prohibition of the Clayton act.

This conclusion renders it unnecessary for me to consider another question, the solution of which is attended with no little difficulty, and that is whether the proposed merger would fall within this act if its effect were to substantially lessen competition. As we have just seen, that act does not in express terms prohibit the acquisition of physical assets. What it prohibits is the acquisition of "the stock or other share capital." What the Bethlehem company in this instance proposes to do is to acquire, not the capital stock of the Lackawanna, but an outright conveyance of its physical assets. The Federal Trade Commission, by a ruling made in 1916, announced that in its opinion the act did not prohibit the acquisition of the physical assets of one corporation by another. As that body, no less than myself, is charged with the duty of enforcing certain provisions of this act, its administrative construction of the section in question is entitled, under a long and well recognized line of authorities, to great weight. In this instance, however, the plan of purchase contemplates that the Lackawanna shall convey its property to the Bethlehem in return for shares of stock of the latter company, to be followed by an early winding up and dissolution of the Lackawanna and the distribution of these shares among the Lackawanna stockholders. I need not, however, stop to consider whether, under other circumstances, this would be a violation of the act, for the conclusion I have just announced makes it unnecessary to do so.

Will a merger of these companies violate the act of April 10, 1918, commonly known as the Webb Act?

These companies are members of an association formed pursuant to the authority granted by this act to handle export trade. It is obvious from what I have already said that this act will in no wise be violated if this merger goes through.

Will a merger of these companies violate the act of Sept. 26, 1914, commonly known as the Federal Trade Commission act?

The Senate's resolution is broad enough to call for an expression of my views upon this point; but for obvious reasons I must decline to express any. The Federal Trade Commission is alone vested with the power of enforcing that act, and as appears from the *Congressional Record*, 67th Congress, 2d session, p. 8872 *et seq.*, that body has preferred a formal complaint against these companies, charging that the proposed merger is an unfair method of competition within the meaning of sec. 5. The Senate will no doubt be quick to perceive the impropriety of my expressing any opinion upon this matter.

Midvale-Republic-Inland Merger

I shall begin by taking up the products common to all three of these companies and present sales figures showing the geographical distribution of the products and the percentage which the production of these companies bears to the entire production in the United States. As in the case of the other merger, I shall deal alone with the year 1920.

Coke and By-Products: The remarks under this heading in dealing with the other merger are likewise applicable here, and accordingly this item does not require separate treatment.

Pig Iron: What has been said under this heading with respect to the other merger likewise applies here.

and repetition is accordingly unnecessary. The three companies combined produced only a small per cent of the entire production in the United States, and are really not in competition with respect to this item, the Republic alone engaging in its sale and then only with respect to that made in Alabama.

Blooms, Billets and Slabs: In the New England district (Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island and Vermont) none of the three companies in 1920 sold any blooms. Midvale sold 33 tons of billets and 3 tons of slabs. The Republic sold 1055 tons of billets, and no slabs. Inland sold neither blooms, slabs nor billets. In the Eastern district (New York, Delaware, District of Columbia, Maryland, New Jersey, Ohio, Pennsylvania and West Virginia) the Republic sold no blooms. The Midvale sold 10,582 tons, over one-half of which went to New York. The Inland sold 36,451 tons, all but 90 tons going to Ohio and Pennsylvania. As a rule the Inland's shipments into this territory are exceedingly small, the heavier tonnage for 1920 being accounted for by the fact that an unusual shortage occurred in this district in that year, and the abnormal conditions which existed at the time were such as to induce Inland to ship a portion of its product to that territory.

With respect to billets the Midvale sold 953 tons; the Republic 6977 tons; the Inland 12,747, all but 154 tons going to Ohio. With respect to slabs Midvale sold 3015 tons; Republic 1845 tons; Inland 15,021 tons, all of which went to a single concern in northern Ohio.

In the Western district (Colorado, Idaho, Illinois, Indiana, Iowa, Kansas, Michigan, Minnesota, Missouri, Montana, Nebraska, Nevada, North Dakota, South Dakota, Utah, Wisconsin and Wyoming) the Midvale sold only 4 tons of blooms, 56 tons of slabs and 2733 tons of billets; the Republic none at all; the Inland 217 tons of blooms and 33,819 tons of billets, of which over 30,000 were sold in Illinois. In the Southern and Pacific Coast districts the sales made by each are so insignificant as to deserve no mention. When we stop to consider that approximately 35,000,000 tons were produced in the United States, we realize how inconsequential this item really is. As stated elsewhere, blooms, billets and slabs are usually used by the steel manufacturer that produces them, the surplus only finding its way to the market and then usually to accommodate some particular manufacturer who happens to be running short.

Sheet Bars: None of the companies sold this product in the New England district. In the Eastern district, Midvale sold 15,792 tons, over one-half of which was sold in Pennsylvania; Republic, 173,533 tons, of which all but 18,759 tons were sold in Ohio; Inland sold 35,300 tons, 22,302 tons going to Ohio and the balance to Pennsylvania. In the Western district, Midvale sold none at all; Republic, 165 tons; Inland, 2928 tons; all but 39 tons being sold in Indiana, where the Republic sold none at all. None of the companies sold in the Southern or Pacific Coast States. It is to be borne in mind that sheet bars are a semi-finished product, the purchaser being the steel manufacturer and not the ultimate consumer. As shown at page 469 of the Iron and Steel Works Directory of the United States and Canada for 1920, there are 37 concerns scattered throughout the United States engaged in the production of this product.

Plates: The entire production in the United States for 1920 was 4,755,133 tons. Midvale contributed 8.22 per cent; Republic 0.75 per cent; Inland 2.31 per cent. In the entire New England and Eastern districts Inland sold only 576 tons; Republic 27,956 tons, 16,215 tons of which were sold in Pennsylvania, 6763 tons in Ohio, and 3153 tons in Maryland. The rest of its sales were scattered through Delaware, New Jersey, New York, Rhode Island and West Virginia. On the other hand, Midvale, whose sales aggregated 269,057 tons, reached every one of the States in these two districts, Pennsylvania, Ohio, New York, Maryland, New Jersey, Massachusetts and Delaware being the heaviest purchasers in the order stated. In the Western States Midvale sold 26,054 tons; Inland 94,850 tons; while Republic sold but 67 tons. In Illinois and Indiana Inland's sales aggregated over 68,000 tons; Midvale's

sales in these two States amounting to about 10,000 tons. In the Southern States, Midvale's sales amounted to 18,260; Republic's, 1137; Inland's, 844 tons. In the Pacific Coast States, Midvale's sales amounted to 6004 tons; Inland's to 3544 and Republic's to 26 tons.

After eliminating the plates made by these three companies in 1920, the remaining production in the United States amounted to 4,218,803 tons, or 88.72 per cent of the total. By referring to the Iron and Steel Works Directory of the United States and Canada for 1920 it will be seen (pp. 472-3) that 62 companies are listed as manufacturers of plates, 58 of which are in the United States.

Sheets: Midvale is not a manufacturer of this article and therefore can be disregarded. In the entire New England and Eastern districts Republic sold 32,204 tons; Inland only 1279 tons, all but 214 tons of which went to Ohio, the remaining 214 finding its way either to New York or Pennsylvania. When we come to the Western district, we find the Republic sold 9077 tons, whereas the Inland sold 84,600 tons. Of the 9077 tons sold by the Republic in this territory, over one-half found its way to Illinois, in which State the Inland sold 44,980 tons. In the Southern district the Republic sold 3709 tons; the Inland 5030 tons. In the Pacific Coast district the Republic sold 1704 tons; the Inland 5751 tons.

The total production of sheets in the United States in 1920 was 4,582,547 tons, Inland contributing 2.3 per cent and Republic 1.09 per cent. Or, to state the matter in a different way, 4,427,158 tons, representing 96.61 per cent of the total production, were produced by other companies. On p. 474 of the directory mentioned under the preceding heading will be found a list of 66 companies, all engaged in the manufacture of plates. The American Sheet & Tin Plate Co. alone has 13 mills, located at various points in Ohio, Indiana and Pennsylvania. (See pp. 21-24 of directory just mentioned.) There were 644 sheet mills in the United States on Jan. 1, 1922, the Republic and the Inland together owning 36 of this number.

Structural Shapes: The Republic does not manufacture this important item and therefore may be disregarded. In the entire New England and Eastern districts the Midvale sold 79,032 tons; the Inland 4174 tons. The Midvale reached every State in this territory; the Inland only Connecticut, New York, Ohio and Pennsylvania, nearly all of its product going to the two latter States. In the Western district, the Midvale sold 13,985 tons; the Inland 106,747 tons. In the Southern district, the Midvale sold 5145 tons; the Inland 1560 tons. In the Pacific Coast district, the Midvale sold 3109 tons; the Inland 7746 tons.

The entire production in 1920 in the United States was 3,306,748 tons, of which Midvale contributed 3.61 per cent and the Inland 3.72 per cent. It will be seen from the figures just given that the great bulk of Midvale's tonnage is marketed in the New England and Eastern territory, where Inland finds a market for about one-nineteenth of the tonnage marketed by Midvale. On the other hand, the great bulk of Inland's tonnage is marketed in the Western district, where Midvale markets about one-eighth of the tonnage marketed by the Inland.

After deducting the tonnage manufactured by these two companies in 1920 from the total tonnage throughout the United States, we have left 3,064,323 tons, or 92.67 per cent of the total. By turning to the Iron and Steel Works Directory for 1920, p. 470, we find a list of 52 concerns engaged in the manufacture of structural shapes at different places in the United States.

Rails: Until recently Midvale was the only one of these three companies to manufacture rails. In March, 1922, Inland, however, began their manufacture and sale. It is apparent from the discussion of this item in dealing with the other merger that no competition between the two companies will exist with respect to rails, the plants of each company being close to 800 miles apart.

Merchant Bars: In point of tonnage this is the most important item in the steel industry. To obtain an accurate idea of the sales made by these three com-

panies it will be well to divide merchant bars into three classes: (1) steel bars; (2) old rail bars; (3) iron bars. Iron bars may be disregarded, the Republic being the only one that makes them. Midvale may be disregarded so far as old rail bars are concerned, for it does not make them. And so far as the New England and Eastern districts are concerned Inland may be entirely disregarded with respect to steel and old rail bars, for it sold none of the latter and only 877 tons of the former.

Coming now to steel bars, in the New England and Eastern districts Midvale sold 132,087 tons; Republic 191,712 tons. In the Western district, sales of steel bars were: Midvale, 30,597 tons; Republic, 44,842 tons; Inland, 73,922 tons. In the Southern district, Midvale, 7945 tons; Republic, 4922 tons; Inland, 1009 tons. In the Pacific Coast district, Midvale, 1526 tons; Republic, 152 tons; Inland, 630 tons.

With respect to old rail bars (which Midvale does not produce) the Republic sold 1219 tons in the New England and Eastern districts; the Inland none at all. In the Western district, the sales were: Republic, 34,366 tons; Inland, 35,868 tons; in the Southern district, Republic, 1464 tons; Inland, 671 tons; in the Pacific Coast district, none at all.

In this connection the fact must not be overlooked that "merchant bars" is a generic term of wide application, embracing different kinds of bars which are used for an endless number of purposes. The bars produced by the Midvale are practically all made on slow-running hand mills. On the other hand, about 75 per cent of the bars turned out by the Republic are made on continuous or semi-continuous mills. The larger part of those produced by the Midvale are of a high grade and of special grades and special sections; while those produced by the Republic and Inland are of a commoner sort—styled common merchant bars to distinguish them from the higher grade article. Because of the wide variety of uses to which these bars are put, the demands of the trade must be satisfied by the production of these various types and grades. Unlike those produced by the Midvale, Inland, for example, makes no special sections. Its product, all of which is made from continuous mills, consists for the most part of rounds, squares and flats, and of what is termed concrete bars.

Still using 1920 figures as a basis, of the entire steel tonnage market by Midvale 14.45 per cent was represented by merchant bars; in the case of the Republic 34.37 per cent; and in the case of the Inland 16.83 per cent.

The total production of merchant bars (iron, steel and old rail bars) in the United States in 1920 amounted to 7,268,313 tons. Midvale's contribution was 2.72 per cent; Republic's 4.77 per cent; Inland's 1.75 per cent; or 9.24 per cent for all three. There are 148 different concerns engaged in the production of these bars, 109 of which make steel bars. A complete list of these various manufacturers and the location of their plants will be found at pp. 478-82 of the 1920 directory above mentioned.

Other Products Made by These Companies: It must not, of course, be inferred that the products above enumerated are the only ones made by these companies. On the contrary, numerous other articles are manufactured, many of them on a large scale. For example, Republic is a large manufacturer of oil and gas pipe, which neither Midvale nor Inland produces. Again, Midvale is a large manufacturer of boiler tubes, rods, drawn wire, wire nails, steel cars, axles and wheels, none of which is produced by the other two. But the above enumeration embraces substantially all of the products of any importance produced in common by these companies.

Will a merger of these companies violate the act of July 2, 1890, commonly known as the anti-trust act?

I see nothing in the proposed merger that offends this act. In my opinion there is not the slightest ground for supposing that it will result in any restraint of trade or monopolistic control. The plants of these companies are widely scattered; and my investi-

gation leads to but one conclusion, and that is that the underlying purpose of this combination is not to acquire a monopoly or to restrain trade, but to enable the new company more effectually to compete with the United States Steel Corporation, which because of the wide distribution of its various plants and their easy accessibility to the source of raw materials, is enabled to produce and sell its products much cheaper than other manufacturers. Instead, therefore, of being in restraint of trade, the new combination will be in furtherance of trade. Its formation has, I believe, been in a great measure prompted by the heavy losses which all of these companies sustained following the marked depression in the steel industry which began over a year ago. These losses, aggregating many millions of dollars, have naturally induced these companies to devise methods of cheapening the production, sale and distribution of their products. By owning plants that are widely scattered, where production can take place in accordance with the needs of the community lying closest to the plants; by manufacturing products at plants advantageously located to ore supplies; by reducing overhead expenses; and by eliminating unnecessary sales agencies, substantial economies can be effected. The combination being formed for this sole purpose, I am unable to see wherein it is tainted with illegality.

Will a merger of these companies violate the Act of Oct. 15, 1914, commonly known as the Clayton act?

What these companies plan to do is to merge the Inland with the Midvale and to acquire outright the physical assets of the Republic. To accomplish this shares of the stock of the new company will be issued to the stockholders of the old companies in exchange for their present holdings, accompanied in the case of the Inland by a payment of something like \$24,000,000 to retire its preferred stock.

In the light of the facts which I have set forth, I fail to discover any ground for asserting that the Clayton Act will be violated.

Will a merger of these companies violate the act of April 10, 1918, commonly known as the Webb act?

As in the case of the other merger, these companies, too, belong to an association formed to handle export trade alone and functioning under the permission which this act gives. In my opinion it is impossible to conceive how a merger of these companies will in any way offend this act.

Will a merger of these companies violate the act of Sept. 26, 1914, commonly known as the Federal Trade Commission act?

Under a like heading in dealing with the other merger I have pointed out the impropriety of my expressing any opinion upon this question. For exactly the same reasons I must pursue a similar course here.

Very respectfully,

H. M. DAUGHERTY,
Attorney General.

HON. CALVIN COOLIDGE,

President of the Senate.

July 21, 1922.

The first regional meeting of the American Society of Mechanical Engineers will be held at Springfield, Mass., Sept. 25, 26 and 27, under the auspices of the Engineering Society of Western Massachusetts. It is planned to make the program broad in scope and interest and thus to provide a meeting calculated to attract membership from a large section of New England and New York State, particularly the eastern section of the latter.

The Walworth Mfg. Co., valves, fittings, etc., has advanced wages six to ten per cent to apply to 1200 workers at the company's South Boston plant, thereby restoring a cut made May 30, which, according to Howard Coonley, president, was not justified by conditions that have obtained since. He states the cost of living has not declined as much as anticipated.

FABRICATED STEEL BUSINESS

Bridge and Building Awards and Tonnages Pending at Leading Centers

Awards for fabricated steel work for the past week include the following:

Power plant for Brooklyn Edison Co., Brooklyn, N. Y., 5000 tons, to McChintie-Marshall Co.

New York Telephone Co., exchange, New York, 1800 tons, Leyering & Garrigues Co.

Public schools Nos. 19 and 69, New York, totaling 650 tons, to Bethlehem Fabricators, Inc.

State Hospital, Trenton, N. J., 200 tons, to American Bridge Co.

Shops for Erie Railroad, Hornell, N. Y., 937 tons, to American Bridge Co.

Tribune Building, Oakland, Cal., 650 tons, to Dyer Brothers.

Central Ferry Bridge, Snake River, Whitman and Garfield counties, Washington, 956 tons, to Penn Bridge Co.

Kansas City Southern Railway Bridge over Arkansas River, Redlands, Okla., 1900 tons, to McClinic-Marshall Co.

Northwestern States Portland Cement Co., building, 194 tons, to Indiana Bridge Co.

Building for Nash Motors Co., Kenosha, Mich., 1000 tons, to H. K. Ferguson Co., steel to be furnished by McClinic-Marshall Co.

Dam No. 44, Ohio River, 620 tons; Lock A, to the American Car & Foundry Co.; Lock B, to the Charles Hegewald Co.; Lock C, to the Penn Bridge Co.; Lock D, to the American Bridge Co.

Commercial building for Zingen & Braun, Sixth and Sycamore streets, Milwaukee, 125 tons, to Milwaukee Structural Steel Co.

Missouri, Kansas & Texas Railroad, shops at Dennison, Tex., 350 tons, to Mississippi Valley Structural Steel Co.

Gas holder at Framingham, Mass., 500 tons, to Stacey Mfg. Co., Cincinnati.

West Technical High School, Cleveland, 500 tons to the American Bridge Co.

Structural Projects Pending

Inquiries for fabricated steel work which may be added to lists of pending projects include the following:

First Church of Christ Scientist, New York, 500 tons.

Young Men's Hebrew Association, Newark, N. J., 1000 tons.

Sinclair Consolidated Oil Corporation, 25 oil tanks for Wyoming field, 7000 tons.

Loft building on Thirty-third Street, New York, 300 tons. Locust Street Office Building, Philadelphia, 400 tons. Chamber of Commerce Building, Newark, N. J., 400 tons. New Nebraska Capitol, 2100 tons, bids being taken.

Apartment building, Chicago, Howard Shaw, architect, Chicago, 700 tons.

Riverside pumping station, Milwaukee, 438 tons, bids close July 27. R. E. Stoelting, commissioner of public works.

Bascule bridge for Florida State Highways at Pensacola, 100 tons, bids being taken.

Jewish Temple, Cleveland, 500 tons, bids to be taken Aug. 14.

Bradford-Carrollton bridge, Cattaraugus County, New York, 500 tons, bids taken.

Court House addition, Akron, Ohio, 500 tons, all bids rejected and to be re-advertised.

Office building at Chestnut and Fifteenth Streets, Philadelphia, for Albert M. Greenfield, 2500 tons.

Railroad Equipment Business

Locomotive orders have been heavy lately, reported awards reaching an aggregate of more than 100. The Illinois Central Railroad has bought 65, the Delaware, Lackawanna & Western 30, and the Southern Railway 6. Evidently anticipating future demands for Mikados, the American Locomotive Co. is asking bids on supplies for 25 to 50 engines of that type. There is a good number of new cars in the business of the past week, the outstanding one being of 3000 composite gondolas distributed among five builders by the Illinois Central Railroad. It is estimated that about 40,000 tons of steel will be required for this and an order from the Reading for 1000 gondolas. Car repair business is heavy; much has been placed but more still is to be let.

Of the 1000 70-ton steel gondolas for the Philadelphia & Reading, 500 will be built by the Pressed Steel Car Co. and 500 by the Standard Steel Car Co.

The 3000 composite gondolas for the Illinois Central have been divided as follows: Pullman Co., 1000; American Car & Foundry Co., 500; Bettendorf Co., 500; Mount Vernon Car Mfg. Co., 500; Western Steel Car & Foundry Co., 500.

The Pittsburgh & West Virginia has ordered 1000 55-ton steel hopper cars from the Cambria Steel Co.

The Baltimore & Ohio has placed 500 box cars for repair pairs with the Streator Car Co., Streator, Ill., and is asking bids for the repair of 750 additional.

The Chicago, Milwaukee & St. Paul Railroad soon will redistribute repair work on 250 gondolas, 500 box cars requiring new steel underframes and heavy repairs and 1250 wooden gondolas.

The Rock Island System will put out for repairs 500 National dump cars, 500 refrigerator cars, 500 automobile and furniture cars and 1500 box cars.

The Chicago, Burlington & Quincy Railroad, which recently placed 500 new box cars with the Streator Car Co., will put out for repairs 500 all-steel gondolas and from 500 to 1000 box cars.

The Chicago & North Western Railroad will put out 1000 or more box cars for repairs.

The Erie Railroad is asking bids on heavy running repair pairs to an indefinite number of box cars.

The Metropolitan Elevated Railroad has awarded 100 new cars to the Cincinnati Car Co.

The Illinois Central Railroad also has placed 65 new locomotives, 25 Mikados with the American Locomotive Co., 25 central type with the Lima Locomotive Co. and 15 switch locomotives with the Baldwin Locomotive Works.

The American Locomotive is in the market for supplies for 25 to 50 Mikados for stock.

The Delaware, Lackawanna & Western Railroad has placed 5 fast freight Pacific and 25 Mikados with the American Locomotive Co.

The Southern Railway has ordered 6 eight-wheel switch engines from the Baldwin Locomotive Works.

NEW OTIS STEEL PLANT

Cleveland Company Will Roll Sheet Bars and Slabs for Its Mills

The Otis Steel Co., Cleveland, is understood to have about completed financial plans for the erection of a steel plant to supply the sheet bar and slab requirements of its plate and sheet mills. An inquiry for buildings for the plant is now in the hands of fabricators. There will be seven open-hearth furnaces and the necessary rolling equipment.

The New York Stock Exchange recently received notice of a proposed increase in the common stock of the Otis Steel Co. from 500,000 to 1,000,000 shares.

The notice, while stating that a special meeting of stockholders will be held on Sept. 15 at Cleveland for the purpose of authorizing the increase in the common stock, gave no details as to the purpose of doubling the amount of outstanding common shares.

The company has a small amount of unissued common stock in the treasury. Under the laws of the State of Ohio a corporation cannot increase the authorized amount of stock so long as it has some stock unissued. In this case the unissued stock is small and the company desired to increase the authorized amount of its common stock considerably. In order to do this a special meeting of stockholders was called to reduce its authorized common stock to the amount now outstanding. That having been done, the company will be in position to have the stockholders vote on the proposition to increase the authorized amount of its common stock from 500,000 shares to 1,000,000 shares.

The California Equipment & Supply Co., 205 North Los Angeles Street, Los Angeles, Cal., is in the market for a steel building 50 to 60 ft. wide and about 240 ft. long, second-hand, and a used 20-ton overhead traveling crane. The company is also inquiring for a tonnage of 8-lb., 12-lb. and 16-lb. rails, new or used, and some $\frac{1}{2}$ -in. to 6-in. black and galvanized pipe, second-hand.

British Iron and Steel Market

More American Pig Iron Purchases—British Loan to Skoda Works—India Buying on Continent (By Cable)

LONDON, ENGLAND, July 25.

In pig iron there are further American and Canadian inquiries for Cleveland and Scotch foundry grades. Some Scotch foundry has been sold for Atlantic ports and for prompt shipment. Home buying is practically stagnant and prices are tending downward. Present supplies are sufficient to meet demand.

Foreign ore is idle.

Steel prices generally are unaltered with small business passing. Some Scottish works have reopened, others remaining idle for all of July.

A British group is reported negotiating a loan of £1,500,000 to the Skoda Works.

Continental sales are moderate. India is the chief buyer. Belgian merchant bars have sold at £8 2s., c.i.f. Bombay. German 14 to 20-lb. rails are quoted at £7 10s., f.o.b..

Tinplates show a weaker tendency on lack of a substantial demand. On prompt business 19s. 7 1/2d. is quoted per base box, f.o.b. Export in tinplate is quiet. The home trade is buying moderately. Odd sizes go at 19s. 3d., f.o.t. August delivery. There is a fair demand for wasters, buyers paying for 28 x 20-in. plates 33s. 6d., f.o.t.

Galvanized sheets are firmer, but demand has not been stimulated. South America bought small lots. Japanese specifications black sheets sold at £15 f.o.b.

We quote per gross ton, except where otherwise stated, f.o.b. maker's works, with American equivalent figured at \$4.46 per £1, as follows:

Durham coke, delivered	£1 6/9	\$5.95
Cleveland No. 1 foundry	4 15	21.18
Cleveland No. 3 foundry	4 8 & 4 8*	19.62
Cleveland No. 4 foundry	4 7 1/2	19.52
Cleveland No. 4 forge	4 5	18.96
Cleveland basic	4 0 & 4 0*	17.84
East Coast mixed	4 11 & 4 11*	20.29
Ferromanganese	15 0	66.90
Ferromanganese	14 10 to 14 15	64.67 to \$65.78
Rails, 60 lb. and up	7 17 1/2 to 9 10	35.12 to 42.37
Billets	7 0 to 8 0	31.22 to 35.68
Sheet and tin plate bars, Welsh	7 7 1/2 to 0 19/7 1/2	32.89 to 4.38 C. per Lb.
Tin plates, base box	0 19/6	4.35 to 4.38
Ship plates	9 0 to 10 0	1.79 to 1.99
Boiler plates	13 0 to 14 0	2.59 to 2.79
Tees	9 5 to 10 10	1.84 to 2.09
Channels	8 19 to 9 15	1.69 to 1.94
Beams	8 5 to 10 0	1.64 to 1.99
Round bars, 3/4 to 3 in.	9 5 to 10 10	1.84 to 2.09
Galvanized sheets, 24 g.	16 0 to 16 10	3.18 to 3.28
Black sheets	12 0	2.39
Steel hoops	12 0 & 12 5*	2.39 & 2.44*
Cold rolled steel strip, 20 g.	23 2 1/2	4.60
Cotton ties, Indian specifications	15 0	2.99

*Export price.

Continental Prices, All F.O.B. Channel Ports, Delivery as Specified

No. 3 foundry pig iron:		
Belgium, August	£4 2 1/2s. to £4 5s.	\$18.40 to \$18.95
Luxemburg, August	4 0 to 4 5	17.84 to 18.95
France, August	4 2 1/2 to 4 5	18.40 to 18.95
Basic pig iron:		
Luxemburg	.....	.....
Billets:		
France	5 15	25.65
Luxemburg, July	6 5	27.75
Lorraine, July	6 5	27.75
Wire nails (keg basis):		
Germany, August	0 14 1/2	3.22
Belgium, July	0 26 1/2	4.55
Wire rods, 5 mm. (0.2 in.):		
Belgium, July	7 5 to 10 7 1/2	32.19 to 46.06
Angles:		
Belgium, September	7 7 1/2	1.47
Tees:		
Belgium, July	8 5	1.64

Merchant bars:

Belgium, October	7 7 1/2	to 7 15	1.47 to 1.54
Luxemburg, October	7 12 1/2	to 7 15	1.52 to 1.54
Germany, October	7 15	to 7 17 1/2	1.54 to 1.56
France, October	7 17 1/2	to 8 0	1.57 to 1.60

Channels:

Belgium, July	7 10	to 7 12 1/2	1.49 to 1.51
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Joists (beams):

France, Sept.	7 15		1.54
Belgium, Oct.	7 5		1.44
Luxemburg, Sept.	7 2 1/2 to 7 5		1.42 to 1.44

2-in. plates:

Germany, Aug., Sept.	7 15	to 8 5	1.54 to 1.64
Belgium, Aug., Sept.	7 15	to 7 17 1/2	1.54 to 1.56

Luxemburg and France, not offered.

1 1/2-in. plates:

Germany	9 0		1.78
No. 8 gage wire:			

Belgium, July, Aug., 14 10/7 1/2

2.87

Favorable and Unfavorable Influences Affecting British Business

(By Mail)

LONDON, ENGLAND, July 13.—Although business generally here is far from active, markets on the whole show a wonderfully confident tone in the face of the many disquieting political and economic problems, such as the threatened breakdown of the Hague conference and the catastrophic fall of the German mark. Certain features assist in stimulating hopefulness. One of these is the cheap rate for money and another the more reasonable attitude of labor, and a third the prospect of a reduction in railroad freight rates commencing at the beginning of next month.

Business with the iron and steel industry generally is restricted, but this is apparently attributable to the succession of holiday periods in various parts of the country. So far as pig iron is concerned, the quantities going into home consumption are not very important, but a fairly brisk export trade has been done and about a week ago a cargo of 1000 tons of special foundry iron was dispatched to the United States, while negotiations for further quantities of ordinary standard quality are proceeding.

So far as manufactured materials are concerned some orders for structural steel have been placed by Indian railroads, as well as for rails, and some of the rail makers are fairly busy. On the whole, however, the trade in manufactured iron and steel is not expanding very rapidly. The prices of Continental material are, of course, unsettled on account of the abnormal condition of the foreign exchanges, and at the moment there does not seem to be much business passing in this class of material.

It is reported that the Imperial Government Railways in Japan have ordered 34 complete electric locomotives from the English Electrical Co., Ltd. This company has five large works, three of which are in the Birmingham neighborhood. Meanwhile the Leeds Forge Co. has dispatched the first of 40 all-steel railroad coaches for the trans-European passenger service.

A matter of some interest is the issue of £2,000,000 7 per cent first mortgage debenture stock on behalf of the Tata Iron & Steel Co. The company has long term contracts for the supply of pig iron to Japan and steel rails to many of the Indian railroads.

A galvanizing unit is being added to the equipment of the Dominion Sheet Metal Corporation, Ltd., Hamilton, Canada. This is estimated to give a total capacity for galvanizing sheets of 22,500 tons per annum. The company reports full operations since March 1 and the outlook as good in view of a highly favorable Canadian crop situation.

The Hymen-Michaels Co., Chicago, recently bought from the Union Pacific Railroad 25,000 tons of 75-lb. to 85-lb. relaying rails, and in the past five or six weeks, including the Union Pacific purchase, has secured a total of 60,000 tons of these rails in various parts of the country.

STEEL STOCKS STRONG

Unfavorable Developments in Coal and Railroad Status Not Depressing

The stock market was remarkably strong last week, in view of the failure of Allan A. Ryan, and the unfavorable developments in the coal and railroad stocks. Steel stocks, for the most part, made gains. That for the week for the United States Steel Common was 1.75 points and $\frac{1}{4}$ on preferred, while the Republic Iron & Steel Co. and the Molybdenum Steel Co. made fractional gains. The market early this week was not so strong as last week.

Steel mill shares made a relatively better showing than industrial securities during the past week. Earnings statements recently issued by independent steel companies are encouraging inasmuch as they show net profits, whereas six months and a year ago deficits were in order. Not in all cases, however, have earnings suggested an early resumption of dividends by these corporations.

The range of prices on active iron and industrial stocks from Monday of last week to Monday of this week was as follows:

Allis-Chalmers	53 $\frac{1}{2}$ - 56	Lima Loco, pf...	-110
Allis-Chal. pf...	98 $\frac{1}{2}$ - 98 $\frac{1}{2}$	Midvale Steel	34 $\frac{1}{2}$ - 38
Am. B. S. & F. pf...	61 - 63 $\frac{1}{2}$	Nat. Acme	17 - 18
Am. Can.	55 - 58	Nat. En. & Strm.	53 $\frac{1}{2}$ - 56 $\frac{1}{2}$
Am. Car. & Fdry.	166 - 169 $\frac{1}{2}$	N. Y. Air Brake	78 $\frac{1}{2}$ - 82
Am. Car. & F. pf...	-121	Nova Scotia Steel	-31 $\frac{1}{2}$
Am. Loco.	114 $\frac{1}{2}$ - 118 $\frac{1}{2}$	Otis Steel	11 $\frac{1}{4}$ - 12 $\frac{1}{2}$
Am. Loco. pf...	-117 $\frac{1}{2}$	Pitts. Steel pf...	-96 $\frac{1}{2}$
Am. Rad. pf...	-116	Pressed Steel	79 - 82 $\frac{1}{2}$
Am. Stl. F. pf...	36 $\frac{1}{2}$ - 38 $\frac{1}{2}$	Ry. Steel Spring	104 - 109
Am. Stl. F. pf...	99 $\frac{1}{2}$ - 99 $\frac{1}{2}$	Ry. Steel Spg. pf...	-112 $\frac{1}{2}$
Bald. Loco.	118 - 121 $\frac{1}{2}$	Repligold Steel	31 $\frac{1}{2}$ - 35
Beth. Steel	74 $\frac{1}{2}$ - 76	Republic	71 - 76 $\frac{1}{2}$
Beth. Steel Cl. B	76 - 79 $\frac{1}{2}$	Republic pf	92 $\frac{1}{2}$ - 93 $\frac{1}{2}$
Beth. Stl. 8% pf...	-114	Sloss	47 $\frac{1}{2}$ - 49 $\frac{1}{2}$
Br. E. Stl. 1st pf...	-73 $\frac{1}{2}$	Steel of Canada	73 $\frac{1}{2}$ - 75
Br. E. Stl. 2d pf...	30 $\frac{1}{2}$ - 31	Superior Steel	32 $\frac{1}{2}$ - 33 $\frac{1}{2}$
Chic. Pneu. Tool.	67 $\frac{1}{2}$ - 71 $\frac{1}{2}$	Trans.-Williams	-39
Colo. Fuel	30 - 32	Un. Alloy Steel	39 - 40 $\frac{1}{2}$
Cruc. Steel	76 $\frac{1}{2}$ - 88 $\frac{1}{2}$	U. S. Pipe	32 $\frac{1}{2}$ - 35 $\frac{1}{2}$
Cruc. Steel pf...	90 $\frac{1}{2}$ - 93	U. S. Pipe pf...	-67
Gen. Electric	171 - 178 $\frac{1}{2}$	U. S. Steel	99 $\frac{1}{2}$ - 102 $\frac{1}{2}$
Gt. No. Ore Cert.	39 $\frac{1}{2}$ - 40 $\frac{1}{2}$	U. S. Steel pf...	120 $\frac{1}{2}$ - 120 $\frac{1}{2}$
Gulf States Steel	81 $\frac{1}{2}$ - 86 $\frac{1}{2}$	Vanadium Steel	46 $\frac{1}{2}$ - 50 $\frac{1}{2}$
Inland Steel	50 $\frac{1}{2}$ - 52	Va. I. C. & C.	50 - 51
Int. Har.	100 $\frac{1}{2}$ - 105 $\frac{1}{2}$	W'house Air Br.	92 - 93
Lack. Steel	75 $\frac{1}{2}$ - 79	W'house E. & M.	59 $\frac{1}{2}$ - 62 $\frac{1}{2}$
Lima Loco.	106 $\frac{1}{2}$ - 111		

Industrial Finance

Stockholders of the Lima Locomotive Works, at a recent meeting at Richmond, Va., approved the refinancing plan submitted by the directors of that company. The plan provides that 48,590 shares of common stock, par \$100, shall be converted into common stock of no par value in the ratio of two shares of new stock for each one share of original stock held. Common shareholders have the right to subscribe, at \$50 a share, for one and one-third shares additional stock of no par value for each existing outstanding share. Preferred shareholders may also obtain the right to subscribe to the new stock by converting their holdings into new common shares.

A public offering is made of \$3,600,000 Consolidated Machine Tool Corporation of America first mortgage 20-year 7 per cent sinking fund bonds, dated June 1, and due in 1942. This issue constitutes the corporation's only bonded obligation. Its capitalization otherwise consists of \$10,000,000 7 per cent preferred stock of which \$6,137,000 is outstanding, and 200,000 shares of common stock of no par value, of which 128,000 shares are outstanding. The total assets of the corporation, after deducting all liabilities other than the funded debt, are placed by the management at \$10,269,589, stress being put on the fact that no valuation has been placed on good-will, contracts or business connections of the company. The current assets are more than six times the current liabilities.

The Gulf States Steel Co., for the quarter ended June 30, 1922, reports net operating income of \$313,740 against \$34,286 in the same period last year. After allowing for all charges, including taxes, depreciation and interest, there was a balance of \$225,664 against a deficit of \$53,353 in 1921.

The Union Trust Co., Pittsburgh, is asking tenders as trustees on \$90,000 Aluminum Goods Mfg. Co. 10-year 7 $\frac{1}{2}$ per cent gold notes. Tenders must be received on or before noon July 31.

The Vanadium Corporation of America reports for the six months ended June 30, net income of \$18,566 after depreciation and depletion, against a deficit of \$64,204 in the first half of 1921.

The Frick-Reid Supply Co., Pittsburgh, has given notice that it will redeem on Sept. 15 next, its \$1,500,000 outstand-

ing preferred stock at 107, and at the same time will pay a dividend of \$2 per share, which will accrue from June 15, to the date of redemption. Stockholders are requested to surrender for cancellation their holdings of these shares to either the company direct, or to the Bank of Pittsburgh, N. A.

The financial statement of the Hayes Wheel Co. for the six months ended June 30, shows a net of \$544,321, compared with \$269,682 for the same period of 1921.

Republic Iron & Steel Profit

The Republic Iron & Steel Co., for the second quarter of 1922, reported a profit after charges of \$86,382, equal to 34 cents a share on the preferred stock, compared with a deficit the preceding quarter of \$712,082 and a loss of \$883,679 for the corresponding quarter of 1921.

The operating profit for the June quarter was \$563,053, against an operating loss of \$508,447 for the similar three months of last year. Depreciation and renewal charges were \$249,575, exhaustion of minerals \$22,322 and bond interest \$204,774.

For the first half of 1922 the company had an operating profit of \$285,989, against a loss of \$38,205 for the corresponding period of 1921. The deficit after charges was \$625,700, contrasted with a loss of \$779,062 in the similar period of the previous year.

Unfilled orders on hand June 30 totaled 196,886 tons, against 130,551 tons on March 31 and 97,265 tons on June 30, 1921.

Colorado Fuel & Iron Quarter

The earnings statement of the Colorado Fuel & Iron Co. for the quarter ending June 30, last, was encouraging in one respect; namely, the cutting down of the deficit. The company in that period showed a loss of \$18,430, contrasted with a loss of \$431,269 in the preceding quarter, and \$273,752 in the corresponding three months last year, after providing for interest on outstanding obligations, taxes, the sinking fund and depreciation.

General Motors Earnings

Net earnings of the General Motors Corporation for the six months ending June 30 were \$35,116,481. This amounts to \$1.30 per share. Its net sales for this period totalled \$218,490,887. After all charges, the amount available for the common stock was \$26,839,391. The first quarter of 1922 showed sales amounting to \$80,590,887, and net earnings \$9,146,481.

Receivers for Thurlow Steel Works

The Delaware County Court at Media, Pa., has appointed receivers for the Thurlow Steel Works, Chester, Pa. It was stated in court that the company owed more than \$1,000,000. It was organized in 1916 with a capital of \$25,000 to manufacture machine tools to machine shells and was forced to shut down when the war ended.

Trade Changes

The Groton Iron Works, New London, Conn., has been leased by the New York, New Haven & Hartford Railroad, according to an announcement by an official of the railroad company. The strike making it impossible to get certain grades of work done was declared to be the reason for the change. The Groton concern, which employed 5000 men during the war, was recently put into a receiver's hands. Present plans are to employ about 800 men to repair locomotives which cannot be handled by the Baldwin Locomotive Works and other plants.

The National Tool Co., Cleveland, has taken over the Save-All chuck business of the Save-All Tool Co., Waltham, Mass. J. C. Dufresne has been employed as manager of the Save-All end.

Commencing Aug. 1 the Drake Hardware Co., Friendship, N. Y., will change its name to the Drake Mfg. Co., Inc.

The Conveyors' Corporation of America, 326 West Madison Street, Chicago, has appointed the Mid-West Engineering Sales Co., Masonic Temple, Cedar Rapids, Iowa, representative in eastern Iowa for the sale of American trolley carriers, which are coal handling equipment of the monorail type. J. W. Holden is manager of the Mid-West Engineering Sales Co.

J. S. Morrison Co., Oliver Building, Pittsburgh, for some years distributor in that district for rolled, forged and cast

manganese steel products, has recently added "wearite" steel to its line of wear resisting steels.

The Nilson-Miller Co., Hoboken, N. J., announces that it has changed its name to Nilson Miller Corporation.

Burt Harris, 30 Church Street, New York, dealer in iron and steel, has taken over the exclusive sales of the Mineral Oil Paint Co., Port Allegheny, Pa.

The Peck Spring Co., Plainville, Conn., maker of springs for typewriters, adding machines and the like and springs of both steel and phosphor bronze, has added screw machines to its equipment.

Plans of New Companies

[No news in regard to new incorporations is published in THE IRON AGE until it has been investigated by correspondence or by personal call.]

R. A. Lister & Co., Inc., is opening an office at 101 Park Avenue, New York. It has recently been incorporated with a capital of 1000 shares, no par value, to import and eventually to manufacture the Lister-Buston automatic electric lighting plant and other machinery. It will also be the agency of R. A. Lister & Co., Ltd., Durisley, England, which has an organization extending throughout all important parts of the world. This new branch is entirely owned and directed by the R. A. Lister Co., Ltd. of England, but it proposes to take in certain American interests which already have some knowledge of these electric plants. The directors have expressed a desire to share the advantage of American banking, and they are now open for banking connections. L. Burbidge is acting as president of the American company, which is represented by J. K. Byard, 120 Broadway, New York. The directors are: George A. Lister, president of the Canadian company, R. A. Lister & Co., Ltd., 58 Stewart Street, Toronto; L. Burbidge and H. M. Towart.

The Driscoll Mfg. Co., Brooklyn, has incorporated with a capital of \$50,000, for the purpose of manufacturing wireless instruments and equipment. The directors are J. F. Driscoll, L. M. Baer and E. Levy. Address Goodman & Werner, 51 Chambers Street, New York.

The Manhattan Crown Seal Co., New York, has filed articles of incorporation with a capital of \$50,000. It will manufacture metal bottle seals and kindred articles. The incorporators are C. C. Abbott, L. M. Rosenthal, Samuel Rosenthal and C. L. Hoadley. Address C. J. Austrian, 27 Cedar Street, New York.

The Monarch Appliance & Radio Corporation, New York, has been incorporated with a capital of \$10,000. The Monarch vacuum cleaner is the main product, but wireless outfits and accessories will also be made. Incorporators: L. Goldberg and A. J. Kollin. Address Jacob W. Block, attorney, 186 Fifth Avenue, New York.

The Marco Metal Works, Inc., Brooklyn, recently incorporated with a capital of \$20,000, will manufacture metal goods, wireless equipment and accessories. Incorporators: M. Wetzstein, Max Planshaft and Robert Tow. The company's plant is equipped.

The H. & S. Automotive Corporation, New York, has been incorporated with a capital of \$10,000 to manufacture automobile equipment and parts. Incorporators: H. Hegeman, C. P. Brown and O. Herrmann. Address Otto Greenberger, 368 Broome Street, New York.

The Modern Automatic Match Machinery Co., New York, has been incorporated with a capital of \$10,000 to manufacture matches, match machinery and parts. Incorporators: C. B. Kinberg, S. M. Wittner and S. M. Friede. Address S. M. Wittner, 565 Fifth Avenue, New York.

Lebaron Carrossiers, Inc., New York, will manufacture automobile parts, motors and particularly bodies. Its capitalization is \$10,000. Incorporators: R. S. Roberts, T. L. Hibbard and R. H. Dietrich. The company is already manufacturing. Address W. H. Ives, 38 Park Row, New York.

The Racony Corporation, New York, recently incorporated with a capital of \$20,000, will manufacture wireless equipment and parts. Incorporators: F. Lewin, A. L. Hecht, Nathan Reznikoff and Julius Schoenberg, Samuel Rubin, 120 Broadway, New York.

Gillis & Geoghegan, Inc., New York, has been incorporated with a capital of \$25,000 to manufacture heating and ventilating equipment. Incorporators: W. M. G. Watson, H. A. St. George and B. W. Dennis. Address Phillips & Avery, 41 Park Row, New York.

The Conly Stoker Co., New York, has been incorporated with a capital of \$100,000. The main item of manufacture is an automatic traveling-grate stoker on which it is ready to receive orders. Incorporators: J. A. Conly, O. S. Magnus and J. H. Eilers, Jr. Address N. J. Toomey, 280 Broadway, New York.

The Mortimer Radio Corporation, New York, has been incorporated with a capital of \$50,000 to manufacture wireless equipment and instruments. Incorporators: M. L. Newman, A. Birnbaum and L. Levy. Address Price Brothers, 261 Broadway, New York.

The Electrolock Mfg. Co., Vicksburg, Miss., has applied for a charter of incorporation which it expects to receive in a few days. Capital stock will be \$100,000. This company is negotiating with several manufacturers with the idea of contracting for the manufacture and possibly the sale of the Electrolock device for locking automobiles. Representatives have been sent North with models and specifications. In case a suitable agreement for manufacturing cannot be closed the company plans to do its own manufacturing.

The B. & C. Magneto Co., New York, has been incorporated with a capital stock of \$15,000 to manufacture magneto and kindred automotive equipment. Incorporators: J. A. Cordary, M. Cordary, and E. R. Horowitz. Address D. M. Freedman, 233 Broadway, New York.

The Squire Mfg. Corporation, 280 Madison Avenue, New York, is manufacturing under contract and distributing patented cooking articles and oil burners.

The Columbia Fence & Wire Co., Dallas, Tex., has its plant over half completed. It is in the market for machinery, such as punch machines, dies, shears and any equipment necessary to a wire fence plant.

The Binghamton Engineering Co. recently organized at Binghamton, N. Y. with A. L. Gilmore as president and Geo. H. Young as treasurer, has opened offices at 777 O'Neil Building for conducting steel and iron business. This company is specializing in the design, fabrication and erection of structural steel, and has recently closed contracts for the erection of the new Masonic Temple, Binghamton Gas Works, and some towers for the Binghamton Light, Heat & Power Co. Contracts have also been closed for structural steel for St. Paul's School, the Chevrolet Garage, a church in Port Dickinson, N. Y., the hospital in Corning, N. Y., and the Red Men's Building at Endicott, N. Y.

The John W. Flower Engineering Co., 2372 West Grand Boulevard, Detroit, has been organized to manufacture a line of water works supplies, together with a patented system of filtration and operating tables. John W. Flower, who is head of the new company, has long been identified with the manufacture of water works supplies. The company has not decided whether to make its new products in a plant of its own. Another company may be organized to conduct the manufacturing work.

The Wright Battery Co., Lynn, Ind., has been organized to manufacture batteries. The company has purchased all of the equipment it will need for the present, but is considering contracting for the manufacture of battery boxes, plates, separators, sealing compounds and other materials which enter into battery manufacture.

The Abbey-Scherer Co., Detroit, has organized a new company to be known as the Advance Wire Works, Ltd., which will engage in the manufacture of some of the products which have been made by the Abbey-Scherer Co. Later on the Advance Wire Works may erect its own building and put in its own equipment. John R. Scherer is president of both companies and other officers are practically the same.

The Reo Motor Car Co., Lansing Mich., has leased a small plant opposite the Swedish Crucible Steel Co. plant at Windsor, Ont. The leased plant is to be used by the Reo Motor Car Co. of Canada, Ltd.

The Dearborn Tractor Appliance Co., Dearborn, Mich., recently incorporated with a capital of \$25,000, will manufacture some of the articles it expects to handle while others will be manufactured under contract. A little later the company may be in the market for equipment.

The Midland Electric Mfg. Co., 220 South State Street, Chicago, does not intend to build at the present time. It is manufacturing and selling an electric hair waver by contract with another firm, although it may manufacture it in the near future.

An automotive production meeting is to be held by the Society of Automotive Engineers in Detroit, Oct. 26 and 27. Papers will be read in the mornings of the days and the afternoons will be devoted to factory inspection trips, with the evening of Thursday given over to a "production" dinner.

STEEL CORPORATION EARNINGS

Second Quarter Shows Marked Improvement for Each Month

The report of the United States Steel Corporation for the second quarter of 1922 shows a comfortable increase in net earnings for the first quarter, the figures being \$19,339,985 for the first quarter and \$27,286,945 for the second quarter. In the first quarter the earnings increased from \$4,654,134 in January to \$8,505,166 in March, and in the second quarter the increase was from \$7,750,054 in April to \$10,712,004 in June. The deficit after the payment of dividends was \$6,749,468 at the end of the first quarter and for the second quarter it was \$1,462,345.

The usual quarterly dividends of 1½ on preferred and 1¼ on common were declared Tuesday. The earnings for the first two quarters of 1922 and for the preceding years were as follows:

Quarters	1922	1921	1920	1919
First	\$19,339,985	\$32,286,722	\$42,089,019	\$33,513,384
Second	27,286,945	21,892,016	43,155,705	34,331,301
Third	.....	18,918,058	48,051,540	40,177,232
Fourth	.....	19,612,033	43,877,862	35,791,302

Net earnings each year \$92,708,827 \$177,174,126 \$143,813,219

Earnings for Second Quarter, 1922

	Earnings Before Charging Interest on the Subsidiary Companies' Bonds Outstanding	Less: Interest on the Subsidiary Companies' Bonds Outstanding	Balance of Earnings
April, 1922	\$8,399,560	\$649,506	\$7,750,054
May, 1922	9,512,938	688,051	8,824,887
June, 1922	11,417,757	705,753	10,712,004
	\$29,330,255	\$2,043,310	
Net earnings			\$27,286,945
Less charges and allowances for depreciation and sinking funds			11,067,432
Net income			\$16,219,513
Deduct interest for the quarter on U. S. Steel Corporation bonds	\$4,823,158		
Premium on bonds redeemed	200,000		5,023,158
Balance			\$11,196,355
Dividends on stocks of the United States Steel Corporation, viz.: Preferred, 1½ per cent	\$6,304,919		
Common, 1¼ per cent	6,353,781		
Deficit			12,658,700
			\$1,462,345

Sound Detector Promising Broad Field of Usefulness

WASHINGTON, July 25.—As the result of experiments made by the Bureau of Mines, the geophone, a novel instrument developed in the war for the detection of earth and rock sounds, promises to become an active factor in the saving of the lives of entombed miners. In tests near Pittsburgh blows with a sledge on a coal face were heard at a distance of 650 ft., with various rooms and entries intervening. On a suspended pipe line, light hammering with the knuckles was detected at a distance of 1500 feet. Ordinary talking and singing could be detected through 150 ft. of solid coal. By the use of two geophones, one instrument to each ear, it is possible to determine the direction from which a sound is coming through the earth. Tests conducted at a busy corner in the downtown district of Pittsburgh located a leak in a water main which the water company had for two weeks vainly sought to detect.

The instrument was invented by the French during the war to detect sapping and underground mining operations. It was developed by the United States engineers, and the instruments now used by the Bureau of Mines were made according to plans drawn by them, except for the introduction of different diaphragms.

MORE PLANTS SUSPEND

Six Blast Furnaces in the Valleys—Coke Production Reduced

YOUNGSTOWN, July 25.—Additional curtailments in iron and steel plant operations in the Mahoning Valley are occurring due to restricted coal supplies. Five blast furnaces have already suspended in the Youngstown district, and Shenango furnace, Sharpsville, Pa., was banked July 22. Fuel shortage forced suspension July 19 of the Cherry Valley furnace at Leetonia, operated by the United Iron & Steel Co. The Youngstown Sheet & Tube Co. has reduced the number of its active by-product coke ovens, thereby decreasing coke production. Coking time of the producing ovens is being lengthened.

Steel makers are concentrating all efforts to obtain fuel and keep their properties operating. Fuel oil, gas and tar are being employed as acceptable substitutes for coal. Small quantities of coal are being shipped into the Valleys from the Pittsburgh and Connellsville regions, but the prices asked are excessive, say industrial buyers. For instance, one large consuming interest reports it was offered gas coal at Pittsburgh at \$8. Some mining interests in Kentucky and West Virginia are asking from \$7 to \$8.

There has been little or no improvement in transportation on railroad tapping the Southern mining districts and connecting with trunk line carriers reaching the Valley district. These roads are still paralyzed by congestion.

Under the promise of Federal protection, Valley independents are considering plans to operate their Pennsylvania coal workings on a larger scale, or to resume where such mines are idle. Operators, however, believe such a move must be concerted if it is to be successful, and contend that all interests must act in conjunction.

They believe many men will go back, if assured of proper protection. Steel companies have sent representatives to the mining districts where coal shipments have been held up, in an effort to expedite such movement, but without appreciable result.

Other difficulties are likewise developing which threaten to cut into operations. The strike has interfered with operations of the Valley Mould & Iron Corporation, Sharpsville, Pa., supplying ingot moulds to Valley steel plants. Any prolonged interruption to the supply of molds will have a hampering effect on steel department operations.

Difficulty has also been encountered in getting through shipments of a fluxing stone employed extensively by Valley independents in the open-hearth process. This stone is quarried near Millersburg, W. Va., and shipments have been largely reduced, though plants have fairly abundant stocks.

In the face of active demand for lapweld and butt-weld sizes of pipe, Valley makers are endeavoring to maintain production, and 15 of 17 pipe furnaces are fired this week. The Youngstown Sheet & Tube Co. is operating ten and Republic Iron & Steel Co. five.

There has been as yet less interference with semi-finished production than with pig iron, aside from suspension of the Bessemer department of the Republic company. The Ashtabula Steel Co., completing an eight-mill sheet property at Ashtabula, Ohio, has closed on part of its sheet bar requirements with a Valley independent. The company plans to begin rolling down bars in August.

The billet and blooming mill at the Sydney, N. S., plant of the Dominion Steel Corporation, are now working double shift, according to a statement issued by the British Empire Steel Corporation headquarters. This new activity will increase the working force to 2300 men. For the first time in the 22 years of its history, the Dominion Steel Corporation has successfully entered the foreign market for finished steel products. Orders are on hand for nails, barbed and galvanized wire for Buenos Aires, South Africa, New Zealand, Costa Rica, Colombia, India and British West Indies.

PERSONAL

Bertram D. Quarrie has been appointed general manager of the Otis Steel Co., Cleveland, and will have charge of the operations of the company's plants under



B. D. QUARRIE

Parker F. Wilson, who has had the title of assistant to the president and general manager. Mr. Wilson's duties will be broadened, and hereafter he will devote considerable attention to the sales department in addition to his other work. Mr. Quarrie, for the past 12 years, has been general superintendent of the blast furnaces and steel works of the American Steel & Wire Co. in Cleveland and has resigned this position to assume his new duties about Aug. 10. He graduated from Case School of Applied Science in 1903.

For a time he was connected with the Grasselli Chemical Co. as a chemist, later went with the Cleveland Furnace Co., as chief chemist, and shortly afterward was appointed blast furnace superintendent of the latter company. He left that company to become assistant blast furnace superintendent of the Cleveland furnaces of the American Steel & Wire Co. For a short time, he was blast furnace superintendent of the Inland Steel Co., Indiana Harbor, Ind., but returned to the Central Furnaces as superintendent. Mr. Quarrie was appointed to his present position in 1910, when Henry A. Barren was promoted to the general superintendency of all the blast furnaces of the American Steel & Wire Co., in the Cleveland, Pittsburgh and Donora districts.

O. P. Hood, chief mechanical engineer of the Bureau of Mines, sailed on July 12 for London. He will spend three months in Europe studying new developments in lignite utilization and the low-temperature carbonization of coal, for the purpose of applying the information to studies in lignite and fuel utilization now being conducted under his direction in the United States by the Bureau of Mines. Mr. Hood will visit England, Germany, Switzerland, Belgium, Holland, Jugoslavia, Czecho-Slovakia, Austria, Italy and France.

F. H. Chapin, vice-president and general manager Upson works of the Bourne-Fuller Co., Cleveland, returned a few days ago from an extended trip to Europe.

L. E. Armstrong, formerly of the engineering department of the Heine Boiler Co., St. Louis, has connected with the Bass Foundry & Machine Co., Fort Wayne, Ind.

H. G. Hoss has been appointed general manager of the Ott Grinder Co., Indianapolis. He was with the Vonnegut Machinery Co. for 11 years, and prior to that was connected with the International Machine Tool Co., both of Indianapolis.

J. A. Beaubien, formerly vice-president and general manager of the Weber Subterranean Pump Co., 50 East Forty-second Street, New York, has been made manager of the New York office of the Pennsylvania Pump & Compressor Co., Easton, Pa.

E. R. Abbott, former New York representative for the Taft-Pierce Mfg. Co., has joined the Dupont Engineering Co., Wilmington, Del., as sales representative for the Wilmington shops, recently opened to contract work.

G. C. Kimmel has been appointed consulting engineer of the Heald Machine Co., Worcester, Mass.

E. C. Rack, former assistant manager of the Precision Instrument Co., Newark, N. J., is now associated with the Johns-Manville Co., Inc. He will engage in research and engineering work in the general offices of the company at New York.

G. M. Thompson, Worcester, Mass., has resigned as vice-president and general manager Wickwire Spencer Steel Corporation, but remains as a member of the board. Mr. Thompson was president of the Clinton, Wright Wire Co. when it was absorbed by the Wickwire-Spencer Steel Corporation, and has been identified with the wire industry for more than 27 years. His health has been impaired for some time and his resignation is with a view of lightening his responsibilities.

Commander A. J. Chantry, Jr., U. S. N., has reported to the Charlestown Navy Yard, Boston, as production manager. He succeeds Commander W. B. Fogarty, who has been assigned to duty at Groton, Conn., as superintendent Electric Boat Co. Commander Chantry formerly was attached to the Philadelphia Navy Yard.

H. F. Barrus, for some years associated with the Union Twist Drill Co., Athol, Mass., has accepted a position as general manager Barrus & Cullen of London, England, and will leave Athol about Sept. 1.

M. B. Layton, a vice-president of the Manufacturers' Light & Heat Co., Pittsburgh, supplier of natural gas, has resigned and will devote most of his time looking after his private gas and oil interests.

W. B. Schiller, president National Tube Co., Frick Building, Pittsburgh, is back at his desk again after being confined in the hospital for some time recovering from an operation on his ankle.

Dr. T. T. Read, chief of the information service of the United States Bureau of Mines, has been appointed by the president of the American Institute of Mining and Metallurgical Engineers the official representative of the institute to attend the International Congress of Engineering, to be held in Rio de Janeiro, Brazil, in September. Dr. Read expects to leave for Rio de Janeiro about Aug. 15.

William S. Silpath, who for 25 years represented the Buffalo Wire Works Co. in the Philadelphia district, has become general manager of the Hub Wire Cloth & Water Works Co., Boston.

F. S. Cox, formerly assistant to the consulting engineer of the Pittsburgh Plate Glass Co., is now chief engineer of the Calorizing Co. of Pittsburgh, and will have direct charge of the Wilkinsburg, Pa., plant, in addition to other duties.

Edward Peterson has become associated with the Birdsboro Steel Foundry & Machine Co., Birdsboro, Pa., as chief engineer. He was formerly assistant chief engineer of the Treadwell Engineering Co., Easton, Pa., and prior to that was assistant to A. F. Backlin, chief engineer of the American Steel & Wire Co., Pittsburgh.

Robert W. Appleton, production engineer of the Pierce Arrow Motor Car Co., Buffalo, has been appointed manager of purchases of that company. He will also continue his duties as production engineer. He has been identified with the Pierce Arrow factory for more than 20 years.

Earl S. Murton, who has been hot mill foreman at the plant of the Inland Steel Co., Indiana Harbor, Ind., recently was promoted to the position of assistant superintendent of the sheet department. Prior to going to the Inland Steel Co., Mr. Murton was with the Canton Sheet Steel Co., Canton, Ohio.

James C. Potter, president, the Potter & Johnston Machine Co., Pawtucket, R. I., recently returned from a trip to Europe.

W. P. Snyder, Jr., president Shenango Furnace Co., Pittsburgh, has sailed for Europe.

James H. Walsh, for 20 years superintendent the rolling department, South Chicago works, Illinois Steel Co., recently resigned that position to become as-

sistant general superintendent the Inland Steel Co., Indiana Harbor, Ind.

F. W. Carter, assistant manager the heavy traffic division, railway department, Westinghouse Electric & Mfg. Co., has resigned to become president of the Louisville Frog & Switch Co., Louisville. Mr. Carter graduated in electrical engineering from the Virginia Military Institute in 1912, and in that year entered the employ of the Westinghouse company in the graduate students' course. Between 1912 and 1916, he filled several important assignments, and then took up heavy traction work in the New York office. The Louisville Frog & Switch Co. manufactures manganese frogs, crossings, switches, signals and other railway specialties.

OBITUARY

CLARENCE H. GAY, for many years identified with the iron and steel business of New England, died June 30, at his home in Boston. He was a native of that city, born in 1833.

GEORGE W. HAMILTON, for 16 years assistant general superintendent Bay View mills, Illinois Steel Co., at Milwaukee, died suddenly of heart failure on July 20, while on a train en route to his summer home on Green Lake, Wis. He was born in Johnstown, Pa., Nov. 1, 1848, and went to Milwaukee in 1906 to take an executive post in the Bay View mills. He was prominent in Masonic and business circles.

ALBERT L. JOHNSON, president the Corrugated Bar Co., Buffalo, died Friday, July 21, at his home in Hamburg, N. Y., a suburb of Buffalo.

C. L. TOWER, New England representative the Babcock & Wilcox Co., steam boilers, died July 19 at his summer home in Allerton, Mass., in his 35th year. He was a member of the American Society of Mechanical Engineers, the Engineers' Club of Boston, and other organizations.

June Automobile Production

Figures received by the Department of Commerce show a further increase in the June production of passenger automobiles and trucks. The total production of passenger cars in June, so far reported, amounted to 261,963, compared to 231,724 in May. This is an increase of over 11 per cent for the month. The total truck production in June was 25,912 machines, compared with the revised figures of 23,803 in May.

With a few exceptions the following table represents the production of identical firms for each month including approximately 90 passenger car and 80 truck manufacturers.

Automobile and Truck Production

1922	Passenger	
	Cars	Trucks
January	81,693	9,344
February	109,170	13,121
March	152,959	19,651
April	197,221	22,227
May	231,724*	23,803*
June	261,963	25,912

*Revised.

Examinations for the position of appraisal engineer, carrying a salary of \$3,000 to \$4,000 per annum, said engineer to be attached to the technical staff of the income tax unit of the Bureau of Internal Revenue, has been announced by the United States Civil Service Commission. Applicants should apply to the commission at Washington for form 2118, stating the title of the examination desired. An examination is also shortly to take place for architectural and structural steel draftsman for the lighthouse service. Applicants should apply for form 1312, stating the title of the examination desired.

UPHOLD JUDGE LANDIS

Labor Union Investigators in Chicago Submit Their Report

CHICAGO, July 24.—A special committee, composed of the presidents of the international building trades unions, which has been holding hearings here on the Landis award of last fall in the building trades controversy, with an idea of bringing about a clarification of the situation, on Saturday submitted a report which completely upholds the award and suggests a reorganization of the Chicago Building Trades Council on a basis of entire recognition of the Landis decision.

The investigation was conducted in accordance with a resolution adopted at the annual convention of the American Federation of Labor at Cincinnati early last month. As is well known, the Landis award did not find favor with a number of crafts and it is no secret that some of the contractors have been violating its precepts. Conditions have been chaotic with distinct wage scales and working conditions for union and non-union workmen. The committee finds that the trouble is due "to the failure of the Chicago Building Trades Council to meet and fulfill its moral obligation as regards its arbitration agreements and the award of its chosen arbiter, Judge Landis."

Evidently, this move toward peace on the part of the unions is not going to find ready acceptance, because James A. Patten, chairman of the citizens' committee for the enforcement of the Landis award, has come out with a statement which indicates that the committee will continue to fight for the establishment of the "open shop." Mr. Patten says: "There can be no compromise with those crafts that refused to work under the award. The open shop plan will still be in effect as to the 13 groups involved. The committee has made its decision and will not yield. The committee has brought 16,000 men to Chicago to work under the award; they will continue in their jobs."

Equipment for a Great Cleveland Building

Considerable mechanical and other equipment and steel for interior construction will be required for the new building of the Union Trust Co., Cleveland, which will be the second largest building in the world. With 1,000,000 sq. ft. of floor space, it will be exceeded in size only by the Equitable Building in New York with 1,200,000 sq. ft. of floor space. There will be 25 passenger elevators, 10 bank elevators serving six floors and three freight elevators, which will be furnished by the Otis Elevator Co. It will be a fire proof building throughout with metal doors and trim and metal window frames and sash. The building will require 1100 or more tons of galvanized steel pipe which will be supplied by the Youngstown Sheet & Tube Co. The electric conduits will take 450 tons, the plumbing 450 tons and the heating system 200 to 250 tons. A large blower fan system will be installed to provide forced air ventilation for banking rooms and lavatories. W. B. VanSickle, Cleveland, has the contract for both the ventilating and heating. Electric current for power and light will be supplied by a commercial company, but it has not yet been decided whether to put in a heating plant or to buy steam from a commercial producer. The contract for the vault doors, vault linings, and deposit boxes has been placed with the Diebold Safe & Lock Co., Canton, Ohio. These will require about 850 tons of steel, largely in alloy steel plates. The building will have 2200 doors and the hardware will cost \$75,000 or more. Contracts for this will be placed shortly.

An increase in the number of employees of Milwaukee industries in June embraced additions of from 200 to 500 men each by three or four of the large metalworking concerns, according to the July issue of Business and Financial Comment, published by the commercial research department of the First Wisconsin National Bank, Milwaukee.

Machinery Markets and News of the Works

STRIKES AFFECT BUYING

Machine-Tool Business Continues in Fair Volume, However

Some Purchases Are Being Held Up Pending Settlement of Present Labor Troubles

Although July business in machine tools continues at a rate which compares favorably with that of June, it is evident that many prospective purchases are being held back pending a settlement of the labor troubles at the coal mines and on the railroads. Railroad buying, which had gotten a fair start before the shop mechanics' strike, has been checked, the railroads announcing that orders will not be placed until their present operating troubles are out of the way. Repair work on locomotives and cars has made it necessary for locomotive and car companies to add to their shop equipment in a small way, outstanding purchases being a driving wheel lathe and car wheel lathe by the

American Locomotive Co. and a multiple punch by the American Car & Foundry Co. The Boston & Albany Railroad has bought a driving wheel lathe and one other machine. The Chicago, Milwaukee & St. Paul has added several items to its recent inquiries. Further purchases by the Atchison, Topeka & Santa Fe are apparently being delayed until the rail strike is settled. There is an intimation that the Illinois Central may place a few orders this week.

Municipal purchases for vocational training schools continue a fairly important factor. The Youngstown Board of Education has ordered about 25 metal-working and woodworking tools from two or three dealers and the city of Boston is in the market for a number of tools and accessories. The Belleville Research Laboratories, Navy Department, Washington, has inquired for lathes, shapers and drill grinders, bids closing Aug. 1.

Export business is dull and the sale of a few machines to a South American country is exceptional among current export transactions.

New York

NEW YORK, July 25.

HERE are few developments of interest in the local machine-tool market. Buying of tools by the railroads has almost wholly stopped, due to the shop mechanics' strike, but business from other sources keeps up at a rate that is fully equal to that of June and in some instances is better than the June records. The American Locomotive Co., New York, has purchased a 90-in. driving wheel lathe and a 42-in. car wheel lathe, and the American Car & Foundry Co., New York, has bought a multiple punch, these companies adding this equipment in all probability to take care of the present rush of repair work on locomotives and cars. The Belleville Research Laboratory of the Navy Department, Washington, has inquired for lathes, shapers and drill grinders, bids closing Aug. 1. Export business is not active, and a sale of several machines for shipment to South America stands out as exceptional among current export transactions in machine tools.

From the standpoint of new inquiries the crane market is quiet, but several orders are pending and a number of overhead cranes were purchased the past week. The 60-ton electric crane recently asked for by the J. G. White Engineering Co. is expected to be closed during the next few days. Action will also probably be taken shortly on the 110-ton crane for a power house, which has been in the market for some time. Sales of hand power cranes are light. Business in locomotive cranes, however, is fairly active in both new and used. Among recent purchases are:

Monitor Bi-Loop Radiator Co., Lancaster, Pa., one 15-ton, 58-ft. span, one 5-ton, 47-ft. span and two 5-ton, 27-ft. span, electric cranes from the Northern Engineering Works.

Frick Co., Waynesboro, Pa., a 25-ton, 68-ft. span electric crane from the Shepard Electric Crane & Hoist Co. and a 10-ton, 74-ft. span and two 5-ton, 35-ft. span electric cranes from Maris Brothers.

Michlowitz & Co., Harrisburg, Pa., a 20-ton,

50-ft. boom locomotive crane for use at Lebanon, Pa., from the Browning Co.

H. B. Streicher Co., Toledo, Ohio, a 20-ton, 50-ft. boom used Ohio Locomotive crane for Oil City, Pa., from Philip T. King, 30 Church Street, New York.

Bertoline Quarries Co., New Haven, Conn., a used Type B, Erie steam shovel from Philip T. King, 30 Church Street, New York.

Schaeffs Foundry, New Orleans, a 1-ton electric traveling crane from the Northern Engineering Works.

Magnolia Petroleum Co., Dallas, Tex., one 25-ton and two 10-ton, 50-ft. spans, overhead traveling cranes from the Northern Engineering Works.

Follansbee Brothers Co., Pittsburgh, a 7½-ton heavy duty monorail hoist for Toronto, Canada, from the Northern Engineering Works.

The Air Reduction Sales Co., 342 Madison Avenue, New York, manufacturer of welding and cutting apparatus, has plans under way for new works at Birmingham, Ala. Other units will be constructed later, with total cost estimated at \$250,000, including equipment.

A. L. Kushner, 15 Central Avenue, Albany, N. Y., is taking bids for a new two-story automobile service and repair building at 43-7 Columbia Street, 70 x 250 ft., to include machine shop, estimated to cost about \$90,000. Howard Rogers, 443 Broadway, Albany, is architect.

The W. S. Freezer & Machine Corporation, 270 Union Avenue, Brooklyn, will install a new gas engine and subsidiary power equipment at its plant.

The Nevada Consolidated Copper Co., 25 Broad Street, New York, has plans under way for rebuilding its concentrating plant, recently destroyed by fire, with loss estimated at about \$2,000,000, including machinery, electrical and power equipment. The new unit will be of like size and cost, approximately, the amount of the loss.

U. G. Stockwell, 175 Jay Street, Albany, N. Y., is planning the erection of a new automobile service and repair building, estimated to cost about \$250,000.

The Murphy Garage, Inc., New York, has leased for 21 years the building now being erected on West 133rd Street, near Broadway, for the establishment of an automobile service and machine repair works. William A. Murphy is president.

Motors, controlling equipment, conveying apparatus and

other equipment will be installed in the nine-story printing plant, 60 x 103 ft., to be erected at 147-51 West Fifteenth Street, New York, by Street & Smith, 79 Seventh Avenue, publishers, estimated to cost about \$150,000, exclusive of equipment.

The Turner-Armour Co., 567 Flushing Avenue, Brooklyn, has plans under way for a three-story addition, 62 x 300 ft., to its cabinet works on Harrison Place, estimated to cost about \$65,000. John E. Nitchie, World Building, New York, is architect.

The Pyramid Iron Products Corporation, 2 Rector Street, New York, will purchase a Corliss engine and subsidiary power equipment for its plant.

The Watson Elevator Co., 407 East Thirty-sixth Street, New York, has completed the purchase of the plant and business of the Reedy Elevator Co., at 1226 Willow Avenue, Hoboken, N. J. It will be used exclusively for Watson type elevators, parts, etc. A repair and service department will be operated from this location, and a similar plant will at 407 West Thirty-sixth Street, New York, continued in operation.

The Board of Public Works, Albany, N. Y., will commence the erection of the new dam on the State Barge Canal at Crescent, about 12 miles north of Albany, and will soon begin work on a hydroelectric generating plant, estimated to cost \$1,000,000. Charles L. Cadle is superintendent of Public Works, in charge.

A power house will be installed in connection with the new one-story plant to be erected on Saw Mill Road, Elmsford, N. Y., by the Horace L. Day Co., 4 White Street, New York, for the manufacture of chocolate products, estimated to cost about \$250,000.

The Johns-Manville Co., Madison Avenue and Forty-first Street, New York, manufacturer of asbestos and fireproofing products, has acquired the Bennett Martin mining properties at Thetford Mines, Que., and proposes to break ground at an early date for a new plant at Asbestos, Que., estimated to cost approximately \$1,000,000, including machinery. The initial works will give employment to about 300 and it is expected to have the mill ready for operation by the end of the year.

Durant Motors, Inc., 1819 Broadway, New York, has concluded negotiations for the purchase of the Locomobile Co., Bridgeport, Conn., including plant and business, for about \$2,000,000, and W. C. Durant has been elected president of the company. Operations will be continued at the Bridgeport works and no immediate change, it is said, will be made.

The Tunnel Garage, Inc., 55 Thompson Street, New York, has awarded a contract to T. J. Murphy, Inc., 2 West Forty-fifth Street, for a new two-story automobile service and repair works at Broome and Thompson streets, estimated to cost about \$55,000.

The American Water Works & Electric Co., 50 Broad Street, New York, operating the West Penn Co., Pittsburgh, and other light and power companies, is disposing of a preferred stock issue of \$1,200,000, the proceeds to be used in connection with the acquisition of the Potomac Public Service Co., operating in western Maryland, Virginia and Pennsylvania, and for extensions and improvements in plants and system. Hobart Porter is president.

The Samsee Corporation, New York, has acquired through G. Montague Mable, 33 West Forty-second Street, property on Columbus Avenue, between 204th and 205th streets, 100 x 200 ft., and will have plans prepared for a one-story automobile service and repair building.

Motors, conveying equipment, power and other equipment will be installed in the new one-story printing plant to be erected at Ossining, N. Y., 150 x 150 ft., by Rand, McNally & Co., 42 East Twenty-second Street, New York, with headquarters at 538 South Clark Street, Chicago. H. Lansing Quick, 18 South Broadway, Yonkers, N. Y., is architect.

A vocational department will be installed in the new three-story high school, 150 x 150 ft., to be erected at Saratoga Springs, N. Y., estimated to cost about \$400,000, for which bids will be asked early in August. Coffin & Coffin, 522 Fifth Avenue, New York, N. Y., are architects. Charles L. Mosher is secretary of the school board.

The Standard Oil Co. of New Jersey, 31 Clinton Street, Newark, will build a new distributing plant, with electric station in the Silver Lake section, Bloomfield, N. J., to cost about \$40,000.

The Morris & Somerset Electric Co., Morristown, N. J., has arranged for a bond issue of \$200,000, the proceeds to be used for extensions and improvements.

Compounding and mixing machinery, power and other equipment will be installed at the plant of the Atlantic Tar & Chemical Works, Inc., Bayway, Elizabeth, N. J., in connection with plant enlargements. To carry out the project, the company has arranged a capital stock and

bond issue for \$500,000, the majority of the proceeds to be used for the expansion. George C. Lewis is president.

A bond issue of \$401,000 has been approved for the erection of a new high school at West Orange N. J., to include a vocational department, exclusive of site. The latter has been secured in the Rollinson tract for \$45,000. Plans will be prepared by Guilbert & Betelle, 546 Broad Street, Newark, architects. Albert Wrensch is secretary of the school board.

Walter C. Jacobs, 9 Campbell Street, Newark, operating a foundry, has commenced foundations for a new three-story plant at 63-73 Warren Street, for which contract recently was let to the American Concrete Steel Co., Essex Building. The new foundry is estimated to cost in excess of \$50,000.

Herpers Brothers, 18 Crawford Street, Newark, manufacturing jewelers, are taking bids for a new four-story plant, 52 x 100 ft., at 474-76 Washington Street, estimated to cost close to \$50,000. Edward A. Wurth, 207 Market Street, is architect.

Van Vleet, Inc., has been organized, with office at Hedden Place, North Fifteenth Street, Newark, N. J., to engage in auctioning, appraising and financing manufacturing plants. The officers are B. Dorf, president; S. H. Berger, vice-president; Herbert Segal, treasurer.

Chicago

CHICAGO, July 24.

REPORTS about the machine tool business in this district vary, but the more common expression is that considering the time of year and the fact that railroad buying is almost completely suspended, pending a settlement of the labor troubles, business is as good as could be expected. The Chicago, Milwaukee & St. Paul Railroad has just put out a new list, which besides a 20-ton crane, calls for two 36-in. lathes, a 28-in. shaper, 34-in. drill press, 44-in. boring mill and an 1100-lb. steam hammer. A couple of these tools were included in a list sent out some time ago. It is of interest that in its latest inquiry this road omits the suggestion that it will consider good used tools, as it did in the last previous list. The Atchison, Topeka & Santa Fe Railroad has not made any additional purchases against its list put out several weeks ago, about half of which had been placed up to a week ago. This road recently closed for a 15-ton crane for Argentine, Kan., with the Milwaukee Electric Crane & Mfg. Co., Milwaukee. Other railroad lists are dormant, although the report is heard in some quarters that the Illinois Central this week may order some of the tools it recently inquired for.

There have been no price changes the past week, and while there are occasional suggestions of an advance, there are quite as many assertions that no immediate change is likely. It is pointed out that an advance at this time could be based only on the present labor, fuel and transportation conditions, which few regard as any more than temporary.

The Radio Parts Mfg. Co., 1028 Van Buren Street, Chicago, recently incorporated for \$10,000, will manufacture variometers, variocouplers and radio parts, and has leased quarters containing 3800 sq. ft., at the above address. It will buy drill and punch presses and winding machines. The officers are Joseph Zabotzsky, president and treasurer; John M. Smith, vice-president, and J. G. Zahradka, secretary.

The Vaughn Machinery Co., 531 McKnight Building, Minneapolis, recently incorporated with a capital of \$175,000, is the outgrowth of the Vaughn Mfg. Co. It now has its grain cleaning machinery built, but may eventually have its own plant and will want metal and wood-working machines. The officers are T. C. Vaughn, president; James J. McCanney, vice-president, and P. H. Vaughn, secretary-treasurer.

The American Water Heater Corporation, 2838 West Twenty-first Street, Chicago, has been incorporated with a capital of 2000 shares of no par value. It will manufacture hardware and automobile specialties. Machinery sufficient for present needs has been installed. The officers are Henry Kocourek, president; Louis Aeby, vice-president, and E. F. Gillis, secretary-treasurer.

The Thermalene Gas Corporation, 413 City Bank Building, Kankakee, Ill., has been incorporated with a capital of \$60,000 and will manufacture gas generators and supplies. The gas is a new hydrocarbon gas for welding, cutting,

lighting, heating and cooking. Buildings will be leased in Kankakee and all necessary equipment is on hand. The officers are S. D. Knight, president; L. Wolf, vice-president; J. S. Knight, secretary.

The Tyree Auto Radiator Co., 814 West Thirty-third Street, Chicago, incorporated with a capital of \$100,000, is manufacturing radiator cores for replacement purposes for automobiles, trucks, tractors and aeroplanes and a complete radiator for Ford cars. The company proposes to build a plant later this year and will want punch presses, sheet metal machinery and specially built machinery, tools and dies. Officers of the company are R. A. Tyree, president; James S. Bradley, vice-president; Fred L. Garst, treasurer and B. M. Rowan, secretary.

The Illinois Publishing & Printing Co., Chicago, publisher of the *Chicago Herald-Examiner* and the *Chicago American*, is reported to have plans for a large printing plant where such parts of the publications as can be printed in advance may be put out. Paul Gerhardt, 64 West Randolph Street, is the architect.

W. F. Hall Printing Co., 466 West Superior Street, Chicago, has bought 14 acres between Diversey Boulevard and Kilpatrick Street, upon which it expects to erect a new printing plant at some future date.

Bids are being received by Henschieu & McLaren, 1637 Prairie Avenue, Chicago, on a 4-story packing plant, 76 x 150 ft. at the Union Stock Yards, for the Western Packing & Provision Co., 3854 South Morgan Street, to cost \$170,000.

The Chicago Flanging & Pressing Co., has purchased the property of the Ketler-Elliott Co., 3121 South California Street, Chicago, comprising 43,566 sq. ft. of land, containing a one-story steel fabricating plant and office building. Plans of the purchasing company with regard to improvements and extensions are indefinite at present.

Bowie, Lydon & Co., 340 West Harrison Street, Chicago, has the general contract for a two-story brick and concrete factory for the McAdam Mfg. Co., to cost approximately \$100,000.

J. P. & J. W. O'Connor, 189 West Madison Street, Chicago, have the general contract for a two-story and basement addition, 50 x 150 ft., with elevator and heating plant, for Pratt & Lambert, Inc., manufacturer of paints and varnishes, on West Twenty-sixth Street, near Princeton Avenue, Chicago, to cost \$60,000.

Contracts have been placed for a two-story, mill construction, factory 40 x 130 ft. at 60 West Superior Street, Chicago, for the F. H. Smith Mfg. Co., machinists, 3047 Carroll Avenue, to cost \$40,000.

The Rockford Malleable Iron Works, Rockford, Ill., has awarded contract to the Austin Co., 208 South La Salle Street, Chicago, for a new one-story foundry, 150 x 200 ft., with extension, 90 x 120 ft., estimated to cost in excess of \$100,000, including equipment.

The United States Reclamation Service, Washington and Denver, Col., will receive bids until Aug. 18, for furnishing radial gates, radial gate hoists, geared hoists, operating machinery and other iron and metal work for the Riverton, Wyo., project of the department. A. P. Davis is director.

The State Board of Control, Lincoln, Neb., E. B. Fairfield, secretary, has awarded a contract to E. S. Clark & Co., York, Neb., for a new two-story industrial school at Geneva, Neb., 26 x 107 ft., estimated to cost about \$50,000.

The Northwestern Paper Co., Cloquet, Minn., has awarded contract to the Siems, Helmers & Schaffner, 514 Guardian Life Building, St. Paul, Minn., for a new two-story paper and pulp mill, 200 x 500 ft., estimated to cost about \$500,000, including machinery. George F. Hardy, 209 Broadway, New York, is engineer.

A power house will be constructed at the new high school to be erected at Maquoketa, Iowa, to include a vocational department, estimated to cost about \$150,000. Arthur Ebeling, 810 Kahl Building, Davenport, Iowa, is architect.

A vocational department will be installed in the new three-story and basement junior high school, 160 x 200 ft., to be erected at Cedar Rapids, Iowa, estimated to cost about \$400,000, for which bids will be asked early in August. Herbert Rugh, 811-13 Security Building, is architect.

The Northwest Refining Co., Billings, Mont., has plans under way for the construction of a new oil refinery at Laurel, Mont., with initial capacity of about 2000 bbl. per day. R. M. Hodgins is general manager.

The Davis-Watkins Dairymen's Mfg. Co., 130 North Wells Street, Chicago, manufacturer of dairy machinery and parts, has awarded contract to the Raulf Co., Milwaukee, for a new one-story plant, 100 x 140 ft., to cost about \$75,000.

Work has been placed under way for a new one-story power house at the plant of the Star & Crescent Milling Co., 108 South La Salle Street, Chicago, at South Chicago, Ill., estimated to cost about \$35,000.

Philadelphia

PHILADELPHIA, July 24.

The A. H. Fox Gun Co., Eighteenth and Windrim streets, Philadelphia, has acquired property at Eighteenth Street and Wagner Avenue, 303 x 504 ft., as a site for a new plant. Plans will be prepared at an early date.

The Badenhausen Boiler Co. and the Badenhausen Co., 1425 Chestnut Street, Philadelphia, manufacturer of power boilers with plants at Bridgeport and Cornwells, Pa., and Bound Brook, N. J., operating under a receivership, is being reorganized and will take out a State charter under the name of the Badenhausen Corporation, to manufacture boilers, tanks, superheaters, power and heating equipment. Application for the charter will be made on Aug. 7.

The Philadelphia Enameling Works, 1311 Vine Street, Philadelphia, has acquired property at 254 North Thirteenth Street, extending to 259-63 North Clarion Street, for extensions.

The N. & G. Taylor Co., 300 Chestnut Street, Philadelphia, has plans in preparation for a new power house at its tin plate works at Cumberland, Md., to include boilers, automatic stokers, coal-handling and ash-handling machinery, etc.

Louis J. Kolb, Tenth and Reed streets, Philadelphia, will build an automobile service and repair works, 56 x 90 ft., at 905-11 Watts Street. H. B. Welden, 10 South Eighteenth Street, is architect.

The Atlantic Elevator Co., Inc., Pennsylvania Building, and the Albro Clem Elevator Co., Erie and D streets, Philadelphia, manufacturers of elevators, have been consolidated under the name of the first noted company. The new organization will be capitalized at \$1,020,000. B. F. Mechling, Jr., is president.

J. W. Vandegrift, Mervine and Cambria streets, Philadelphia, has awarded contract to Henry E. Baton, 1713 Sansom Street, for a two-story and basement mechanical maintenance and repair works, 111 x 226 ft., to include machine and other departments, estimated to cost about \$200,000.

W. A. Breese, Philadelphia, has acquired the building, 100 x 150 ft., at Sixty-fifth and Media streets, with adjoining property, 68 x 100 ft., for an automobile service and repair works.

The Universal Service Motors Co., 1407 Locust Street, Philadelphia, has leased property at 1825-33 Market Street, 110 x 180 ft., for new branch works. Alterations and improvements will be made in the present building. The company will also commence the erection of a six-story addition to its plant at Seventeenth and Manning streets, 70 x 117 ft.

The Bureau of Water, City Hall, Philadelphia, has awarded contract to the Robbins Contracting Co., 1137 North Front Street, for the installation of coal and ash-handling equipment at the Queen Lane Pumping Station, to cost \$68,350.

The Washington Plating Co., 28 South Seventh St., Philadelphia, manufacturer of plated wire, has leased a floor in the building at 141 North Third Street for extensions.

The Westinghouse Electric & Mfg. Co., Widener Building, Philadelphia, has awarded contract to the Consolidated Engineering Co., Calvert Building, Baltimore, for a ten-story factory and distributing branch, 95 x 191 ft., at Thirtieth and Walnut streets.

A vocational department will be installed in the new two-story junior high school to be erected on West State Street, Trenton, N. J., estimated to cost about \$900,000. J. Osborne Hunt, 219 East Hanover Street, is architect. R. C. Belville, 9 South Stockton Street, is secretary of the school board.

The Pennsylvania Railroad Co., Broad Street Station, Philadelphia, has acquired seven acres on the Dillersville Road, Lancaster, Pa., from the Burnham Boiler Co. It will be used for new classification yards, freight houses, shops, etc., estimated to cost close to \$250,000.

The Daniels Motor Car Co., Reading, Pa., is arranging to double the present plant capacity. George E. Daniels is president.

A cold storage and refrigerating plant will be erected in connection with the proposed meat-packing plant to be established at Bethlehem, Pa., by the Confederate Home Abattoirs Corporation, Portland, Me., estimated to cost close to \$1,000,000, with machinery. The company is in negotiation with the Bethlehem Chamber of Commerce for a suitable site, and has opened local offices in the Odd Fellow's Building.

The W. L. Connell Coal Co., Scranton, Pa., has tentative plans for rebuilding its coal washery, known as the Enterprise Washery, at Kulpmont, Pa., destroyed by fire, July 15, with loss estimated at \$30,000, including equipment.

The Topton Foundry Co., Topton, Pa., manufacturer of

iron and steel castings, etc., has work under way on a new one-story machine shop. Nathan Kline heads the company.

The Williamsport Building Products Co., Williamsport, Pa., care of Elmer Dittmar, 1603 Erie Avenue, architect, has completed plans for the erection of a new one-story factory, 57 x 160 ft.

The Harrisburg Light & Power Co., Harrisburg, Pa., has arranged for a bond issue of \$44,000, the proceeds to be used for extensions and improvements.

The Harrison Safety Boiler Works-Cochrane Corporation, Seventeenth and Clearfield streets, Philadelphia, is completing the erection of a foundry, 100 x 352 ft., at Ernest Station, Norristown, Pa., to replace the plant destroyed by fire several months ago.

The W. S. Lehrman Pattern Works, Allentown, Pa., has removed its plant from 600 Turner Street to 15 North Church Street, where increased facilities will be arranged, including a department for experimental work in pattern design.

The Jordan Electric Co., Allentown, Pa., is being organized to conduct and operate an electric power plant and system in Heidelberg Township. Silas R. Rothermel, Allentown, represents the company.

The Standard Tank Car Co., Sharon, Pa., has plans in progress for an addition, 50 x 100 ft., estimated to cost about \$70,000. It will be used for assembling.

Pittsburgh

PITTSBURGH, July 24.

A FAIR amount of new machine tool business is being closed, but the bulk of orders on which estimating has been going on for the past three or four months is held up by the coal and rail strikes. One interest states it has more prospective business on its books than at any time in three years, and expects to close most of it as soon as the strikes are settled. Inquiries all coming from coal operators whose mines are closed, and some of these will result in sales in the near future. There is also considerable inquiry from steel mills for heavy equipment, and from machine shops for lighter machine tools.

Prices are firm and most of the radial drill manufacturers advanced quotations the past week about 5 per cent. Makers of other machine tools state that with increased costs of fuel, higher labor and manufacturing costs, they will have to get more money for their tools. It is a fact, however, that when a good inquiry comes in, competition is very keen and usually low prices are named.

The only machine tool list which came out the past week was from the Pittsburgh Railways Co. and included two lathes, two drill grinders, two woodworking tools and a small bench drill.

The local office of the Shepard Electric Crane & Hoist Co. has sold to the Wheeling Bronze Casting Co. a 2-ton electric crane, and other equipment to the Greenville Steel Car Co., Greenville, Pa.

The Consolidated Light, Heat & Power Co., Huntington, W. Va., has plans for the erection of a \$15,000 brick and steel building for which some new equipment will be needed.

The National Sanitary Co., Salem, Ohio, is planning to rebuild its works, recently destroyed by fire.

The General Refractories Co., Oliver Building, Pittsburgh, has acquired the plant and property of the Hayes Fire Brick Co., Orviston, Pa., Possession will be taken about Aug. 1. The company recently acquired the plant of the Pennsylvania Fire Brick Co., Beech Creek, Pa.

A vocational department will be installed in the new junior high school to be erected at Oil City, Pa., for which plans are being prepared by E. E. Bailey, Chambers Building, architect.

The Jones & Laughlin Steel Co., Ross Street, Pittsburgh, has filed plans for an addition to its Southside Works, East Carson Street, to cost about \$50,000.

The Raymilton Refining Co., Raymilton, Pa., has plans under way for a new refinery at Mercer, Pa., to provide more than four times the present plant capacity. It is proposed to remove the latter refinery to the new location later.

The Citizens' Light & Power Co., Oil City, Pa., has arranged for a capital stock issue of \$95,000, a portion of the proceeds to be used for extensions and improvements.

The Stroh Steel-Hardening Process Co., Westinghouse

Building, Pittsburgh, with plant at Thirty-second Street and Allegheny Valley Railroad, has acquired the property of the Pittsburgh Knife & Forge Co., at Chateau Street and Ridge Avenue, consisting of brick buildings on a site 68 x 100 ft., and will use it for extensions.

The Westinghouse Electric & Mfg. Co., East Pittsburgh, is arranging for the installation of shears and other equipment at its new tin works, now in course of construction at Trafford City, Pa.

The Greer & Laing Hardware Co., Wheeling, W. Va., is planning the erection of a new works at 1327 Main Street, to be five-stories, 90 x 137 ft., and estimated to cost about \$150,000.

M. S. Hodges, Franklin, W. Va., has tentative plans for the organization of a company to construct and operate a hydroelectric generating plant and system on the Potomac River.

The Guyan Machine Shops, Logan, W. Va., have inquiries out for a new power boiler, 80 to 100 hp., also machine shop equipment, including band wheel, scroll saw with tilting table, etc.

The Warren Steel Car Co., Warren, Pa., manufacturer of tank cars, etc., has arranged for rebuilding a portion of its plant by day labor, replacing the structures destroyed by fire recently with loss of about \$70,000. M. Mathis is general manager.

A vocational department will be installed in the addition to be erected at the Peabody high school, Highland Avenue, Black and Beatty streets, estimated to cost about \$500,000. Edward B. Lee, Chamber of Commerce Building, is architect.

The Virginia Electric Co., Charleston, W. Va., formerly the Virginia Electric & Machine Works, has tentative plans for extensions and improvements in its power house and system. The company has recently increased its capital to \$300,000.

The Wheeling Oxygen Co., 1130 Market Street, Wheeling, W. Va., has plans in progress for the erection of a new plant on Sixteenth Street, Warwood, W. Va. The Industrial Engineering Co., Park Building, Pittsburgh, is engineer. I. S. Scott is president.

A vocational department will be installed in the high school addition to be erected at Paw Paw, W. Va. C. R. White is secretary of the school board.

Baltimore

BALTIMORE, July 24.

The City Council, Easton, Md., has authorized plans for extensions and improvements in the municipal electric power plant, including the installation of turbo-generators and auxiliary equipment.

The Crown Cork & Seal Co., 1511 Guilford Avenue, Baltimore, has arranged for a bond issue of \$4,000,000, a portion of the proceeds to be used for extensions and improvements. J. M. Hood, Jr., is president.

J. E. Moxley, Jr., Equitable Building, Baltimore, architect, has completed plans for a three-story automobile service and repair building, 42 x 125 ft., estimated to cost about \$100,000. It will be owned and operated by M. S. Block, Baltimore.

The Northern Maryland Electric Co., Port Deposit, Md., is concluding arrangements for the purchase of the plant and property of the Port Deposit Electric Co. and will make extensions and improvements. To carry out the project, a bond issue of \$85,000 is being arranged.

The Tin Decorating Co. of Baltimore, Boston Street and Linwood Avenue, Baltimore, manufacturer of metal specialties, has filed plans for the erection of a one-story addition, 23 x 137 ft.

The United Railways & Electric Co., Baltimore, is disposing of a note issue of \$2,500,000, a portion of the proceeds to be used for power house extensions, betterments, etc. C. D. Emmons is president.

The City Council, Macon, Ga., will receive proposals at an early date for a municipal electric power plant.

A. L. Flint, general purchasing officer, the Panama Canal, Washington, will take bids until Aug. 8 for bronze seal strips, wire nails, bibb cocks, globe valves, yellow metal and other materials, for use in the canal zone.

The L. Rosenfeld Mfg. Co., 105 South Hanover Street, Baltimore, manufacturer of bakers' utensils and similar equipment, has filed plans for a new one-story factory, 46 x 147 ft. to cost about \$17,000.

The Alexandria County Lighting Co. and the Arlington Electric Co., Alexandria, Va., has been merged as the Alexandria Light & Power Co., with capital of \$650,000. It is planning for extensions and improvements in power plant and system.

A vocational department will be installed in the pro-

posed high school to be erected at Claymont, Del., estimated to cost \$285,000. Bonds are being arranged and plans will soon be prepared.

George W. Koiner, Petersburg, Va., has organized a company to construct and operate a five-story and basement cold storage and refrigerating plant on Bollingbrook Street, totaling about 70,000 sq. ft. of floor area and estimated to cost in excess of \$500,000, including machinery.

The Lincolnton Creamery & Ice Co., Lincolnton, N. C., is arranging to rebuild its ice-manufacturing plant, recently destroyed by fire with loss estimated at about \$100,000.

A vocational department will be installed in the new three-story junior high school to be erected at Roanoke, Va., estimated to cost about \$150,000. H. Courcy Richards, 608 Chestnut Street, Philadelphia, is architect.

Fire, July 15, destroyed the plant and machinery of the Union Box & Lumber Co., West Point, Va., with loss estimated at about \$75,000. It is said that it will be rebuilt.

The Charleston-Anderson Motor Co., 106 East Bay Street, Charleston, S. C., recently organized, will establish a service and repair works. A local building has been acquired which will be remodeled. F. R. Baker is president.

The Pennsylvania Railroad Co., Baltimore, and the Norfolk & Western Railroad Co., Roanoke, Va., have commenced construction of their new joint engine terminal, with shop and repair facilities, at Hagerstown, Md. The structure will provide for about 40 locomotives.

G. C. White & Son, 406-8 North Fifth Street, Richmond, Va., are planning for the installation of a number of new machine tools.

Eugene F. Bates, Greenville, S. C., has awarded contract to the Fiske-Carter Construction Co., Greenville, for a two-story automobile service and repair building on College Street.

The Rocky River Power Co., Cunnock, N. C., is arranging a list of equipment for installation in its new hydroelectric generating plant.

Morris Brothers, Greenville, N. C., have tentative plans for a new plant to manufacture bobbins and other textile mill equipment. D. L. Morris is president.

The Alsop Motor Co., 918 West Broad Street, Richmond, Va., is planning for the installation of a lathe, drill press and other machine tools.

The Suffolk Coal & Ice Co., Suffolk, Va., recently organized with a capital of \$50,000, has taken over the local ice-manufacturing plant of the Crystal Ice & Fuel Co., and plans for extensions and improvements. A. E. Harvell is president.

A vocational department will be installed in the new high school to be erected at Warrenton, Va. Smith & May, Calvert Building, Baltimore, are architects.

The Munn & Griffon Co., Rocky Mount, N. C., is planning for the installation of new refrigerating and cold storage equipment.

The Virginia Machinery & Well Co., 1319 East Main Street, Richmond, Va., is making inquiries for a steel cable-way, about 200 ft. long and 1½ tons capacity.

Cleveland

CLEVELAND, July 24.

THE demand for machine tools fell off during the week and sales generally were limited to single tools. The possible effects of the coal and railroad strikes have caused some industrial concerns to delay placing orders and have also retarded railroad buying. Automobile and automobile parts manufacturers are still purchasing some equipment, but orders from this source were mostly for single machines. Sales by some local dealers during July will show a gain over June, owing to the fact that some fair sized orders which had been pending several weeks were placed this month. About 25 metal and wood-working machines for the Youngstown Board of Education, which have been hanging fire for some time, have been distributed among two or three dealers. Crane inquiries have improved somewhat, but orders are slow in closing. The Lima Locomotive Works, Lima, Ohio, will require several cranes for its proposed plant extensions.

Foundry operations in Ohio showed a slight gain July 1 over June 1, according to the monthly report of the Ohio State Foundrymen's Association. At present the foundries reporting are operating at slightly over 50 per cent of capacity.

While the small shops are fairly busy many of the large shops are still operating at limited capacity, which accounts for the low average operations.

The Toledo Automatic Brush Machine Co., Toledo, Ohio, has been incorporated to manufacture machines for making brushes. It has a capitalization of \$200,000 in preferred stock and 60,000 shares of no par common stock. It is stated that the men identified with the Kent Owens Machine Co. and the Owens Bottle Machine Co. are interested in the new organization. George P. Greenhalgh is president, and John R. Cowell, vice-president and general manager.

At a recent meeting of the stockholders of the Lima Locomotive Works, Inc., Lima, Ohio, refinancing plans for extensions were approved, the estimated cost of which is \$1,500,000. Bids have been taken for an addition and the company is expected to buy considerable machinery. It is understood that it has prepared a list, but it has not yet been sent to the trade.

The Cleveland Folding Machine Co., 5200 Euclid Avenue, Cleveland, plans the erection of a two-story factory and warehouse, 96 x 180 ft., to cost approximately \$100,000.

The Canton Malleable Iron Co., Canton, Ohio, is planning to enlarge its works by the erection of a building to be used for an annealing department.

The National Sanitary Co., Salem, Ohio, is preparing plans for rebuilding its factory, recently damaged by fire.

The Akron Bronze & Aluminum Co., Akron, Ohio, will add to its products the manufacture of fireless cookers.

The Standard Equipment Co., Lorain Avenue and West 106th Street, Cleveland, plans the erection of a forge shop, 60 x 200 ft.

New England

BOSTON, July 24.

THE city of Boston is asking quotations on one wet tool grinder, one 16-in. shaper and four 13-in. x 5-ft. screw cutting engine lathes, in addition to motor, anvil, tool-stand and vise equipment and a small list of wood-working machinery, for the Frank V. Thompson school. This is the largest individual inquiry put out the past week. The General Electric Co., West Lynn, Mass., is considering the purchase of one or two high priced single tools, more or less specialties. The Mead, Morrison Co. list, East Boston, for the production of tractors, is unfilled, and the Worthington Pump & Machinery Corporation has yet to purchase a 56-in. cold saw for its Cambridge plant, and the Boston & Albany Railroad a 90-in. wheel lathe and box facing and boring machine. Between 70 and 85 per cent of the other inquiries in the market are from small concerns, many of them new, about to engage in the manufacture of some special product. A small amount of metal-working equipment is involved in each instance. The leading New England industries are putting out few feelers on machine tools.

The largest individual sale the past week was two new 16-in. x 8-ft. lathes and 12 used machine shop tools, including lathes, milling machines, planers, shapers and drill presses, to a Portland, Me., interest. Other sales included a new 6-ft. radial drill and an automatic tapping machine, costing approximately \$1,300, to two textile companies; a new 16-in. x 8-ft. lathe and a used milling machine to a Portsmouth, N. H., firm; a used 6-in. gear cutter to a Connecticut maker of bag machinery; two 16-in. x 6-ft. new South Bend lathes to the New Bedford vocational school; a 14-in. x 6-ft. used standard lathe to a Vermont garage, and possibly a dozen small and lower priced lathes to Massachusetts and Maine garages. So far this month about 30 tools at the Bath shipyard of the Texas Co. have been sold to interests outside of New England, some of the machines being very large.

Prices on machine tools are steadier and general belief in the trade is that values will be marked up between now and fall.

Local houses reporting no sales of machine tools the past week have been compensated to some extent by an exceptionally good business in chucks, taps, dies, chasers, drills and other small tools. A New England car builder, recently taking on considerable repair work as a result of the strike

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the United Shoe Machinery Corporation, Boston, and paper cup manufacturers have been leaders in purchases of small tools, sales of which have far exceeded business booked in any previous week this year. The plumbing and fittings industries are large purchasers of threading tools.

The property of the Marine Engineering & Dry Dock Co. of Rhode Island, Allen's Avenue, Providence, will be sold in one lot at auction on Aug. 3.

The Salem Laundry Co., Lafayette Street, Salem, Mass., has awarded contract for a two-story and basement garage, 30 x 140 ft., to cost approximately \$120,000.

Bids are in for a three-story, 40 x 50 ft. service station contemplated by Louis A. Blair, 27 Church Street, Cambridge, Mass.

Plans are being prepared for a water power development, including a 30 x 80-ft. power house, for the Salmon Falls Mig. Co., Salmon Falls, N. H. Charles T. Main, 200 Devonshire Street, Boston, is the engineer.

Papers are being drawn for the organization of the Hartford Products Corporation, Hartford, Conn., capitalized for \$100,000, to manufacture joints and automobile parts, and possibly brushes. Jarvis McAlpine Johnson, John F. Forward, C. M. Bigelow and Maj. Robert Woodbury are the principals.

The Hart & Hegeman Mfg. Co., Capitol Avenue, Hartford, Conn., manufacturer of electric light supplies, etc., will soon let contract for a four-story reinforced concrete addition, 32 x 181 ft. Greenwood & Noerr, 847 Main Street, Hartford, are the engineers.

The Sprague Meter Co., 203 Water Street, Bridgeport, Conn., is in the market for a used 34-in. squaring shear, for use on tin and sheet metal.

The Milford Electrolytic Iron Co., Milford, Conn., recently organized, is remodeling the factory of Page & Netterton, recently leased and expects to start production in about two months. Laboratory equipment and new machinery will be required.

The Safety Car Heating & Lighting Co., Dixwell Avenue, Hamden, Conn., will shortly start work on a one-story brick addition, 106 x 115 ft., to its main factory. Another one-story building will also be erected, about 100 x 200 ft. Stovel & Brinckerhoff, New York, are the engineers.

Frederick L. Mills, 617 State Street, Bridgeport, Conn., will soon start the erection of a garage and service station, on the corner of State and Hansen Streets. It will be one-story, 54 x 100 ft.

In connection with general plant expansion and the operation of its new plant at Syracuse, N. Y., the Lamson Co., 109 Boylston Street, Boston, Mass., has filed articles of incorporation under State laws, with a capital of \$3,000,000, to manufacture pneumatic tube systems, pneumatic machinery and parts.

Frankel & Warshaw, 262 Atlantic Street, Stamford, Conn., are taking bids for the construction of a two-story automobile service and repair works, on State Street, with machine repair department, 85 x 90 ft., estimated to cost close to \$100,000. S. Z. Levine, Gurley Building, is architect.

The Dawn Mfg. Co., Fairfield Avenue, Bridgeport, Conn., manufacturer of washing machines, is planning for the installation of new equipment. R. A. Leckie heads the company.

The Hygrade Lamp Co., Salem, Mass., is arranging for the immediate installation of equipment in its new four-story addition, 50 x 110 ft., now nearing completion. The extension will total 100,000 sq. ft. of floor space and will have a capacity of about 30,000 lamps daily.

The New Dawn Town Garage, Inc., Providence, R. I., is taking bids for an automobile service and repair works on Richmond Street, to include a machine shop. It will have a capacity of about 250 cars. William R. Walker & Son, Providence, are architects.

The Connery Machine & Tool Co., 4 Fisk Avenue, Springfield, Mass., has filed plans for a one-story addition, estimated to cost about \$17,000.

The Eastern States Refrigerating Co., Springfield, Mass., with branch plants at Albany, N. Y., and Jersey City, N. J., has granted for a bond issue of \$1,500,000, a portion of the proceeds to be used for extensions and improvements.

The Central Railway of Vermont, St. Albans, Vt., is considering the installation of additional machine tools at its shops.

A vocational department will be installed in the new high school addition to be erected at Fairfield, Conn., estimated to cost about \$160,000. O. C. S. Ziroli, Court Exchange Building, Bridgeport, Conn., is architect.

The Connecticut Light & Power Co., Hartford, Conn., is planning for the construction of a power dam and hydro-

electric plant on the Housatonic River, in the vicinity of West Cornwall.

Detroit

DETROIT, July 24.

The Auto Specialties Mfg. Co., St. Joseph, Mich., manufacturer of automobile jacks, shock absorbers, etc., will take bids immediately for an addition estimated to cost about \$100,000, including equipment. Davidson & Weiss, 53 West Jackson Boulevard, Chicago, are architects. J. W. Tiscornia is vice-president.

The Best Stove & Stamping Co., 145 East Atwater Street, Detroit, is planning for the installation of new pressing equipment.

C. H. Wills & Co., Marysville, Mich., manufacturers of automobiles, have established a branch plant at Sarnia, Ont.

The Par-Kar Coach Co., Detroit, manufacturer of automobiles, has acquired the plant of the Bollstrum Truck Co., St. Louis, Mich., for new works.

The Lincoln Motor Co., Warren and Livernois streets, Detroit, operated by the Ford Motor Co., Highland Park, Mich., is taking bids for a one-story addition, 250 x 800 ft. Improvements will be made also to present buildings. Albert Kahn, 1000 Marquette Building, is architect and engineer.

Officials of the Lorraine Motors Co., Beverly, Mich., are perfecting plans for the organization of a new company to take over and operate the plant for the manufacture of automobile parts and equipment. Plans for the manufacture of automobiles have been abandoned. J. L. Dornbos, Grand Haven, Mich., is secretary and treasurer in charge.

The Washtenaw Motor Co., Ann Arbor, Mich., is taking bids for a new automobile service and repair works, to cost about \$75,000; 60 x 200 ft. Cuthbert & Cuthbert, 327 East Huron Street, are architects and engineers.

The Garber Machine Co., Bay City, Mich., is planning for the installation of new equipment in its machine shop and foundry.

The Packard Motor Car Co., Boulevard and Belt Line, Detroit, is having plans prepared for a one-story building, estimated to cost about \$40,000. Albert Kahn, 1000 Marquette Building, is architect.

Buffalo

BUFFALO, July 24.

The Board of Education, 1401 Telephone Building, Buffalo, will take bids until Aug. 2, for vocational equipment for the public schools, including variety saw, grinder, lathes, motors, anvil, shearing machine, oven furnace and holdall. The Associated Buffalo Architects, Inc., Delaware Court Building, 232 Delaware Avenue, are architects. James Storer is secretary.

Officials of the United States Light & Heat Corporation, Niagara Falls, N. Y., manufacturer of electric storage batteries, railroad car lighting equipment, etc., have organized the United States Light & Heat Corporation of California, as a subsidiary, to erect a branch plant at Oakland, Cal. Plans are being drawn and it is proposed to commence construction early in the fall.

The Endicott Forging & Mfg. Co., North Street, Endicott, N. Y., is planning for the installation of new tools and machinery.

The Beaver Products Co., Beaver Road, Buffalo, a subsidiary of the Beaverboard Co., has acquired the plants of the American Cement Plaster Co., Port Clinton, Ohio, and other points, the acquisition comprising 12 complete mills. The new owner will continue operations and plans a number of extensions and improvements.

The plant and property of the New Process Gear Corporation, 500 Plum Street, Syracuse, N. Y., a subsidiary of the Willys Corporation, will be offered at public sale on Aug. 22. The parent organization is now in receivership, and the disposition of this plant will complete the liquidation of the physical properties.

The Oneonta Battery Co., Oneonta, N. Y., has commenced foundations for a new two-story plant, 100 x 100 ft. A complete repair department will be installed.

The Great Lakes Dredge & Dock Co., Morgan Building, Buffalo, is planning for the installation of machine tools and other equipment in a repair shop on Katherine Street.

The Rectograph Co., Inc., 307 St. Paul Street, Rochester, N. Y., manufacturer of photographic equipment, is planning the erection of a new one-story plant, estimated to cost close to \$20,000.

The Associated Motor Industries, Inc., Dayton, Ohio, recently organized, has closed the plant of the Covert Gear Co., Grant Street, Lockport, N. Y., one of the divisions of the

organization, pending the change in the local management and proposed improvements.

A vocational department will be installed in the new two-story high school, 146 x 150 ft., to be erected at Perry, N. Y., for which bids are being received until Aug. 2. Gordon & Kaelber, 125 Sibley Building, Rochester, N. Y., are architects. T. H. Donnelly is secretary of the local school board.

The Fonda, Johnstown & Gloversville Railroad Co., Gloversville, N. Y., operating an interurban line, is planning for the issuance of bonds for \$550,000, a portion of the proceeds to be used in connection with extensions and improvements of electric plant and system.

The Erie Mop & Wringer Co., West Commercial Street, East Rochester, N. Y., plans the installation of additional machinery.

The Lautz Marble Corporation, 861 Main Street, Buffalo, has plans in progress for a new works, estimated to cost about \$85,000. Equipment for cutting, grinding, polishing, etc., and conveying machinery will be installed.

Cincinnati

CINCINNATI, July 24.

EFFECTS of the coal and rail strikes are being felt in the machine-tool industry. Last week showed a falling off in the number of orders placed with local manufacturers, and the explanation advanced is that with a transportation tie-up in prospect placing of orders would be of little benefit to the purchaser. Some buying was done, however, and while the automotive industry continued as the leader, other lines took a greater number of tools than previously.

A Wisconsin truck manufacturer inquired for four machines for immediate delivery, and a local manufacturer who quoted three-weeks' delivery was informed that the machines had to be shipped on the day the order was received.

A local manufacturer booked some orders for export, including two machines for France and three for Australia. Canada is also increasing its purchases from this country, and a local builder is in receipt of a number of inquiries from Canadian houses for tools for shipment to other countries.

An inquiry from the Mexican Government was received during the week, but until the Obregon ministry is officially recognized it is not likely that much business will be done in that country.

Local dealers report a fair demand for small tools, and used equipment is also moving in better volume.

The Board of Education, Louisville, Ky., is asking bids on an addition to the vocational school, to cost about \$50,000. It will be 26 x 176 ft., two stories, and will be equipped as an automobile mechanics' and electrical shop. Woodworking and printing departments will also be installed. Bids will close Aug. 4.

Milwaukee

MILWAUKEE, July 24.

ALTHOUGH the continuance of the strike has delayed to a marked extent the purchase of machine tools by railroads, it has speeded up buying by the automotive and other metal-working interests. Purchases, however, are for one or two machines for immediate delivery and no large lots are appearing. The railroad difficulties have not had as yet any material effect on deliveries, but the production situation is apprehensive of the effect of the miners' strike. Fuel supplies here are very low, replenishment has suffered further setbacks, and the outlook is alarming unless output of coal is resumed without further delay and deliveries from lower Great Lakes' ports are speeded up.

The Nash Motors Co., Kenosha, Wis., has let the general contract to Theodore Stark & Co., 130 Muskegon Avenue, Milwaukee, for a two-story brick and steel addition, 200 x 950 ft., to the four-cylinder car division works in Milwaukee. It will be equipped for general sheet-metal working processes and open body manufacture, including also a new administration building. The project represents an increase of about one-third capacity of the addition originally planned, due to

the improved prospects in the passenger car manufacturing industry. The H. K. Ferguson Co., Cleveland, is architect and engineer. B. W. Twyman is general manager of the Milwaukee Nash works.

The Acme Gas Mixer Co., Superior, Wis., manufacturing carburetion and other gas engine specialties, is negotiating with the Association of Commerce of Stoughton, Wis., with a view of relocating its plant and offices. An option has been taken on an existing building. C. A. Peterson is president.

The G. R. & S. Motor Co., Appleton, Wis., has broken ground for a two-story garage and service building, 48 x 90 ft., at Morrison and Washington streets. The general contractor is Earl F. Miller, Inc., local. With equipment now being purchased the investment will be about \$20,000.

The Waukesha Stanchion Co., Waukesha, Wis., is a new \$20,000 corporation organized by Lewis K. Wilson, Harry L. Horning and S. A. Perkins, and will establish a factory for the production of steel stanchions and other metal barn and dairy fixtures.

The Milwaukee Electric Railway & Light Co., Milwaukee, through its parent corporation, the North American Co., has acquired the common stock of the Milwaukee Northern Railroad, a local and interurban electric line running northward from Milwaukee 60 miles. The new owner will immediately build about 25 miles of connecting lines, purchase several new passenger and express cars, and make other improvements, according to a statement by John I. Beggs, president and general manager.

The White Rock Mineral Springs Co., Waukesha, Wis., has engaged Henry C. Hengels, architect, 445 Milwaukee street, Milwaukee, to design a power plant addition estimated to cost about \$25,000, including new boilers and other equipment.

The Kewaunee Mfg. Co., Kewaunee, Wis., manufacturer of laboratory furniture and fixtures, contemplates the erection of two additions, 40 x 112 and 24 x 108 ft., to the main factory, and a lumber tempering building with a capacity of 350,000 ft. It is overcrowded with orders from high schools, colleges, hospitals and commercial and industrial institutions for equipment which will require the maximum existing capacity until May 1, 1923. C. G. Campbell is general manager.

The Sanitary Novelties Co., Eau Claire, Wis., has been chartered with a capital stock of \$25,000 to manufacture milk containers and other packages for foodstuffs. A factory will be equipped at once. The principals are J. E. Llewellyn, L. C. Zarbeck and F. J. Berg, all of Eau Claire.

The Mattefs Brothers Co., Antigo, Wis., has started work on a two-story brick and mill factory, 80 x 200 ft., and is inquiring for equipment for manufacturing hardwood novelties, toys, interior trim, etc. Later a dry kiln and warehouse will be erected, and it is planned to add a sawmill unit early in 1923.

The Heath Cedar Co., Marinette, Wis., has broken ground for a two-story addition, 50 x 100 ft., to its factory at Sherman and State streets, and will install 12 additional woodworking tools for fabricating interior finish, silo material and other specialties. Individual electric motor drive is employed throughout the plant. Earl Heath is president and general manager.

The Consumers Lumber & Coal Co., Portage, Wis., has awarded contract to the Godfrey Mfg. Co., Elkhart, Ind., for the entire equipment of a new coal storage and handling plant.

The Middle Wisconsin Power Co., Madison, Wis., has been incorporated with a capital stock of \$25,000 by C. W. Kernston, William J. P. Aberg and J. B. Sanborn, to build and operate electric light and power, gas and other public utilities. Other definite information is not available, but it is stated that construction of a hydroelectric generating plant is to be undertaken before the end of the year.

The Wisconsin Public Service Co., Green Bay, Wis., principal subsidiary of the Wisconsin Securities Co., 425 East Water street, Milwaukee, has acquired the entire properties of the Oshkosh, Wis., and the Menominee-Marinette Light & Traction Co. Improvements in both properties will be made. Plans for the Menominee-Marinette division include additional hydroelectric and steam generating equipment in the Menominee main station and construction of a transmission line from the High Falls line to the Grand Rapids hydroelectric station on the Menominee River near Menominee, Mich. Specifications for the Oshkosh gas plant improvement have not been completed. Clement C. Smith, Milwaukee, is president.

The movement undertaken by a committee of Milwaukee business men, headed by Clarence R. Falk, president the Falk Corporation, to secure the proposed American aircraft establishment of A. H. G. Fokker, Amsterdam, Holland, is maturing. A \$100,000 fund has nearly been raised to finance a survey of aircraft transportation possibilities throughout

the country, as well as suitable sites in Milwaukee, with land and water facilities for terminal and manufacturing establishments. Mr. Fokker has returned to Holland but expects to come back to Milwaukee in about 60 days for further discussion with the committee. Francis A. Vaughn, consulting engineer, has been appointed director of the survey.

Indiana

INDIANAPOLIS, July 24.

The Highway Iron Products Co., Ligonier, Ind., manufacturer of structural steel products, culverts, etc., is arranging for the removal of its plant to South Bend, Ind., where a site has been selected for a new plant with considerably increased capacity. The company has recently increased its capital from \$350,000 to \$700,000 for expansion.

The Board of Sanitary Commissioners, City Hall, Indianapolis, is taking bids until July 31, for a new one-story power plant at the sewerage disposal works, to have a capacity of about 300 hp., and estimated to cost about \$250,000, including machinery. Charles H. Hurd, 1405 Merchants' Bank Building, is engineer.

A number of electric light and power companies in Indiana are planning for the construction of new generating plants and systems, as well as extensions to present plants, including the Indiana Service Corporation, Fort Wayne, estimated cost \$300,000; Indiana Power Co., Vincennes, \$75,000; Wabash Valley Electric Co., \$50,000; the Indiana & Michigan Electric Co., South Bend, \$750,000; Indiana Utilities Co., Angola, \$35,000; the Spencer Light, Power, Heat & Water Co., Spencer, \$12,000; the Martinsville Gas & Electric Co., Martinsville, and the Washington Water, Light & Power Co., Washington, Ind.

The Zenite Metal Co., 201 North West Street, Indianapolis, has awarded a contract to the Service Construction Co., Indianapolis, for a one-story addition, 100 x 200 ft., on North West Street, estimated to cost about \$100,000, including equipment.

The Louisville Cement Co., Louisville, Ky., is planning to rebuild the portion of plant at Speeds, Ind., destroyed by fire July 13, with loss estimated at about \$350,000, including equipment.

The Central Indiana Power Co., Indianapolis, formerly the Merchants' Public Utilities Co., has arranged for a bond issue of \$7,500,000, a portion of the proceeds to be used for plant extensions and improvements. Joseph H. Brewer is president.

A vocational department will be installed in the new two-story and basement high school to be erected at Salem, Ind., estimated to cost about \$100,000, for which plans are being contemplated by Paul Moosmiller, Ninth and Market streets, New Albany, Ind., architect.

The Hydroelectric Light & Power Co., Connerville, Ind., will make extensions and improvements in its local plant and system to cost about \$200,000.

The Central South

ST. LOUIS, July 24.

The Sedalia Light & Traction Co., Sedalia, Mo., has acquired property at Broadway and Ingram Avenue for a new steam-operated electric power house. Plans are being prepared for a building 100 x 100 ft., with installation to include electric generator, switchboard, boilers, automatic stokers, coal and ash-handling machinery, etc. It is estimated to cost approximately \$350,000.

A vocational department will be installed in the new three-story and basement high school to be erected at Liberty, Mo., 140 x 190 ft., estimated to cost about \$125,000. E. A. Smith, 602 Finance Building, Kansas City, Mo., is architect.

The Unity School of Christianity, Ninth Avenue, Kansas City, Mo., will commence the erection of a new three-story power house and machine shop, 50 x 60 ft., estimated to cost about \$50,000. Elmer Boillot, 1202 Scarritt Building, is architect.

The Standard Underground Cable Co., Westinghouse Building, Pittsburgh, will proceed at once with the erection of its new plant at St. Louis, which has been held in abeyance owing to a strike in the building trades. The plant will cost in excess of \$500,000 and is expected to be ready for the installation of machinery early in the fall.

The Carthage Superior Spring Bed Co., Carthage, Mo., has abandoned plans for the time being for the construction of its proposed new plant, estimated to cost about \$40,000.

The City Council, St. Joseph, Mo., is arranging a bond issue of \$300,000, the proceeds to be used for extensions and improvements in the municipal electric plant, including new machinery.

The Kansas City Power & Light Co., Kansas City, Mo., has arranged for a preferred stock issue to total \$5,676,100, a portion of the proceeds to be used for extensions and improvements in power plants and system.

The Federal Cold Storage Co., 3003 North Broadway, St. Louis, recently organized with a capital of \$550,000, will commence the erection of a new ice-manufacturing and cold storage plant. It will have an ice-making capacity of 300 tons a day, with refrigerating equipment of 1000 tons daily, and cold storage department to approximate 15,000 tons of space. P. D. C. Ball is president, and J. P. Kelly, manager.

The Haines & Noll Co., Wichita, Kan., an interest of the Haines Tile & Mantel Co., 152 North Market Street, is planning for the installation of equipment in a building to manufacture belting, shafting, hangers and other transmission apparatus.

The Wonder State Crystal Co., Little Rock, Ark., recently organized, has plans under way for the establishment of a plant to manufacture radio equipment. John Thornburg is president, and T. A. Wright, secretary.

The Rex Auto Specialty Co., 630 North Main Street, Wichita, Kan., is planning for the installation of machine tools, etc., to manufacture automobile equipment.

The Central Power & Light Co., Pocahontas, Ark., has arranged for an increase in capital from \$2,500,000 to \$5,000,000, a portion of the proceeds to be used for power plant extensions and improvements.

The Empire District Electric Co., Joplin, Mo., will install a new 10,000-kw. turbo-generator at its power plant at Riverton, Mo., to replace present equipment, including new auxiliary machinery, estimated to cost close to \$300,000. It will make other extensions and improvements in its plants and system, with the total expenditure in excess of \$1,000,000.

A vocational department will be installed in the new junior high school to be erected at Sapulpa, Okla., estimated to cost about \$175,000. Jewell Hicks, West Main Street, Oklahoma City, Okla., is architect.

The Tennessee Eastern Electric Co., Johnson City, Tenn., is arranging for a preferred stock issue of \$600,000, a portion of the proceeds to be used for extensions and improvements in power plants and system.

The Henry Vogt Machine Co., Tenth Street and Ormsby Avenue, Louisville, has plans in preparation for a new three-story and basement building, 50 x 80 ft., estimated to cost about \$40,000. It manufactures ice-making and refrigerating machinery.

The Louisiana & Arkansas Railway Co., Texarkana, Ark., is taking bids for a one-story locomotive repair shop, 130 x 286 ft.; forge shop, 60 x 80 ft.; power house 17 x 35 ft.; and a number of other structures at Stamps, Ark. The installation will include 24-in. slotter, 60-in. wheel lathe, 48-in. boring machine, flat turret lathe, 48-in. car wheel borer, 24-in. shaper, double car wheel press, 4-ft. radial drill, 2500-lb. steam hammer, forge upsetting machine, bolt heading upsetting machine, 18-in. lathe, and other miscellaneous tools. Three electric traveling cranes, each about 90 tons capacity, and 65-ft. span, will be installed, as well as two 100-kw. electric generators and auxiliary equipment. Harrington, Howard & Ash, Kansas City, Mo., are consulting engineers. C. G. Lunday is vice-president and general manager.

The Kansas Gas & Electric Co., Wichita, Kan., will make extensions and improvements in its power plants and system to cost about \$2,000,000.

The Gulf States

BIRMINGHAM, July 24.

The Columbia Fence & Wire Co., Dallas, Tex., is planning for the erection of an addition, 200 x 212 ft., on adjoining plot recently leased.

The Rule-Jayton Cotton Oil Co., Stamford, Tex., has acquired about 21 acres as a site for a new cotton oil mill, estimated to cost \$150,000.

Fire, July 10, destroyed the power house and saw mill of the Deal-Powers Lumber Co., Vance, Ala., with loss estimated at \$50,000, including equipment. It is planned to rebuild.

The Mayhew Produce Co., Brady, Tex., has preliminary plans under way for a new cold storage and refrigerating plant.

The Missouri, Kansas & Texas Railroad Co., St. Louis, has awarded a contract to the Mount Vernon Bridge Co., Kansas City, Mo., for its new locomotive shops at Bellmead, Tex., at a cost of \$642,000, exclusive of equipment. The main shop will be 222 x 475 ft., with capacity of 16 engines; a number of smaller structures will be built and

with equipment will represent an investment in excess of \$1,000,000.

The Hill City Mfg. Co., Tallahassee, Fla., recently organized, has secured a local building and will operate a plant to manufacture automobile tire rims and other metal specialties. George V. Stein heads the company.

The Texas Utility Co., Lubbock, Tex., will proceed with the immediate erection of additional units at its new electric generating plant, following the completion of the first section, which was placed in service July 13. A number of power lines will be constructed. The entire project is estimated to cost in excess of \$250,000.

The American Ice Co., Dallas, Tex., will commence the erection of an ice-manufacturing plant on local site. All equipment will be electrically driven and a power house will also be established.

The Todd Shipyards Corporation, Mobile, Ala., has work under way on extensions and improvements at its shipyard, and expects to have the plant ready for service early in the fall. The yard will be devoted to repair operations. Headquarters of the company are at 25 Broadway, New York.

The City Council, Melville, La., is planning for extensions and improvements in its municipal electric power plant to cost about \$40,000.

The Guidry Brick Co., Lafayette, La., is planning for enlargements to double, approximately, the present capacity. A. Guidry heads the company.

The Alabama Saw Mill Co., Magazine, Ala., is planning to rebuild the portion of its plant recently destroyed by fire with loss estimated at about \$50,000, including machinery.

A vocational department will be installed in the new high school, 98 x 106 ft., to be erected at Newberry, Fla. Plans have been prepared. T. M. Bryan, Gainesville, Fla., is architect.

The Dillingham Ice Cream Co., Breckenridge, Tex., will build a new ice and cold storage plant, with capacity of about 65 tons per day.

The City Commission, Lakeland, Fla., has plans under way for the installation of additional equipment at the municipal electric power plant.

Fire, July 15, destroyed a portion of the distributing plant of the Magnolia Petroleum Co., Beaumont, Tex., with loss estimated in excess of \$1,000,000, including stock, buildings and equipment.

The Forsechler Wagon Mfg. Co., New Orleans, has plans under way for a new two-story factory, 60 x 150 ft., estimated to cost \$25,000, including equipment. Paul Andry, 840 Gravier Street, is architect.

The City Council, Vero, Fla., has plans in preparation for the enlargement of the municipal electric light and power plant, estimated to cost \$40,000, including equipment.

The Consumers Ice Co., Tampa, Fla., will call for bids early in the fall for a new ice-manufacturing plant. Equipment will be electrically driven. Clyde Perry is manager.

The Electric Motor Co., 114 South Franklin Street, Tampa, Fla., has plans under way for an addition. A list of equipment is being arranged.

Canada

TORONTO, July 24.

A SLIGHT improvement in the machinery market was noted last week and sales were heavier than for the two or three preceding weeks. Prospective buying for the early future looks promising, according to the inquiries being received, and it is the general opinion that a good demand for practically all lines of equipment will appear in the early fall, providing the coal strike in the United States has no serious effect on manufacturing operations this side of the border. Notwithstanding that United States railroads have been entering the market for equipment and rolling stock, nothing of this nature has developed in Canada, and it is pointed out that the various railroads in the Dominion are well supplied with equipment and that rolling stock is in good order.

The automotive industry is still buying some equipment, and dealers look for more activity from this source as soon as some of the plants under construction are nearer completion. Foundry and general iron working tools have been backward for some time, but improvement in these lines has recently been reported and prospects for the future are good. Municipal governments are

entering the market for equipment for water-works, sewage, electric and incinerator plants and companies handling these lines are busy. Wood-working tools are in active demand. Equipment for pulp and paper mills is also being purchased freely and in the past two weeks several announcements have been made of arrangements to build additions and new pulp and paper mills.

Small tools have taken another turn for the better and manufacturers and dealers report good business.

C. N. Tingle, secretary-treasurer, Hanna, Alta., will receive bids until Aug. 7 for the supply and installation of one 100-kw. generator and exciter, direct connected to a compound steam engine to be erected in the power house, one 50-kw. similar unit, two 150-hp. return tubular or water tube boilers and accessories, including mechanical stoker, switchboard and street lighting equipment, transformers and copper wire.

The Town Council, Alvinston, Ont., plans the erection of a pump house and installation of electrically operated pumps. John Irving is clerk.

The Fort William Paper Mill Co., Mission street, Fort William, Ont., will erect a mill there at a cost of \$300,000.

John Gray, Collingwood, Ont., has organized the Georgian Bay Spring & Metal Co., and will specialize in the manufacture of springs for motor car and other industries.

The Lion-Mead Rubber Co. has secured an option on six acres at Wrightville, Que., where it proposes to erect a plant for the manufacture of tires, tubes and Mead valves. When in full operation it will employ between 300 and 500 men.

The planing and woodworking mill owned by McCullough Brothers, Debret Station, near Truro, N. S., was totally destroyed by fire with loss to building and equipment estimated at \$35,000.

The Pacific Coast

SAN FRANCISCO, July 18.

The Southern California Ice & Cold Storage Co., San Bernardino, Cal., has plans for a new four-story ice-manufacturing and cold storage plant on Third Street, estimated to cost about \$135,000, including machinery. Harold E. Jones, Katz Building, San Bernardino, is architect.

The Mariposa Mining Co., Bagby, Cal., is planning to rebuild its power house near Bagby, destroyed by fire, July 14. An official estimate of loss has not been announced.

D. D. Duncan & Co., 239 South San Pedro Street, Los Angeles, manufacturers of sash, doors, etc., are preparing plans for a new one-story factory, 107x136 ft., on Fifty-eighth Street. O. M. Warner, 220 Stimson Building, is architect.

The Consumers Ice & Cold Storage Co., 801 D Street, Sacramento, Cal., has plans under way for extensions and improvements to cost about \$25,000.

The Three Lakes Lumber Co., Three Lakes, near Everett, Wash., is reported to be arranging to rebuild its saw mill and lumber plant, destroyed by fire July 11, with loss estimated in excess of \$500,000, including machinery, power equipment, etc.

The Murphy Timber Co., Banks, Ore., is planning to rebuild its electrically-operated mill, recently destroyed by fire with loss estimated at about \$300,000, including equipment.

The Standard Oil Co. of California, 200 Bush Street, San Francisco, is planning for the construction of a new distributing plant at Santa Paula, Cal.

The Northern Pacific Railroad Co., St. Paul, Minn., is planning the erection of a new electric power house at Glendive, Mont., to cost about \$125,000.

The Economic Mfg. Co., Sacramento, Cal., manufacturer of piston rings, etc., has leased property at 115-17 Broadway, Oakland, Cal., for a new plant and will remove to the new location. F. M. Moore is president.

The Southern California Edison Co., Los Angeles, has made application to the city officials, Long Beach, Cal., for permission to build a new power house on West Third Street. Plans are being prepared.

The Cameron-Hogue Lumber Co., Portland, Ore., has plans under way for rebuilding the portion of its mill recently destroyed by fire, with loss estimated at about \$40,000.

Fire, July 15, destroyed the building occupied by the Acme Pattern Works, Puget Sound Mfg. Co., and the Puget Sound Metal Works, Tacoma, Wash., causing a loss estimated at about \$50,000.

NEW TRADE PUBLICATIONS

Ovens.—Paul Machler Co., 2210 West Lake Street, Chicago. Booklet, 33 pages, $10\frac{1}{2} \times 7\frac{1}{2}$ in. Describes and illustrates the company's ovens, all of which are built sectional with the exception of small portable and muffle types. Several pages are devoted to the construction of the standard unit which includes assembling or setting up, gas heated ovens, including indirect types, are described and specifications and dimensions given. Electrical heat and its adaptation to the ovens is outlined and includes electric heater and control equipment. A section is devoted to conveyor and special type ovens and other sections to core ovens, oven accessory and other equipment. The booklet is profusely illustrated, many views of actual installations of various types of equipment being included.

Ball Bearings.—Nice Ball Bearing Co., Nicetown, Philadelphia. Loose-leaf booklet, $4 \times 7\frac{1}{2}$ in., 40 pages, gives sizes, specifications and list prices of various types of the company's ball-bearings, which include the angular type, turned cone, not-ground, single and double, combination types and thrust types. Ball bearing, flat type and diamond ball retainers, ball bearing sheaves and wheels are also included. Discounts in effect as of April 15 are given.

Welding Rods & Electrodes.—Page Steel & Wire Co., Monessen, Pa. Catalog 500, devoted to Page-Armco welding rods and electrodes, giving the history and manufacture of Armco iron and various industries that use welding rods and electrodes. The illustrations include various products welded by the company's materials. Several pages are devoted to useful information, metric conversion tables, weights and measures, decimal equivalents, comparisons of wire gages, etc.

Oil Engines.—Charter Gas Engine Co., Sterling, Ill. Catalog No. 22, 56 pages, $7\frac{1}{2} \times 10\frac{1}{2}$ in., describes and profusely illustrates the company's type "R" oil engine. The type is large and the photographic reproductions unusually adequate. Several pages are devoted to describing the details of construction with several views and cross-section views of various parts of the mechanism. Illustrations include various designs in which the engine is built and several pages are given to testimonial letters, each letter having reproductions of photographs of machines using the engines described in the catalog.

Flexible Couplings.—Thomas Flexible Coupling Co., Warren, Pa. Booklet, 14 pages, $8\frac{1}{2} \times 11$ in. The company's flexible couplings for main mill drives, for heavy-duty reversing mill drives and for other service are illustrated and described, the illustrations including actual installation. What is said to be the world's largest flexible coupling, having a capacity of 10,000 hp. at 100 r.p.m. and weighing 14 tons, is shown connecting a motor to 132 in. plate mill at the Brier Hill Steel Co. Sectional views, a partial list of users, and specifications sheets, are included.

Lock Washers.—Reliance Mfg. Co., Massillon, Ohio. Catalog No. 6, 32 pages, listing various types of lock washers, both in plain and positive patterns and giving tables of washer widths, thicknesses and sizes for bolts and machine screws. For convenience, the washers are furnished in various assortments in packages of different sizes and also in a display case containing an assortment.

Boring Mills.—Colburn Machine Tool Co., Cleveland. Bulletin B-103, 12 pages, devoted to a description of the company's new heavy-duty boring and turning mills. Each unit of the mechanism is clearly described and illustrated and a phantom view of the machine shows the oil circulating system. The manipulation of the single-lever control for both feed and rapid traverse is illustrated.

Internal Grinder.—The Garvin Machine Co., New York. A four-page booklet describing and illustrating the Bright Internal grinder, a vertical spindle machine for the accurate grinding of straight round holes on a production basis.

Magnetic Chucks.—O. S. Walker Co., Inc., Worcester, Mass. Catalog W-2, 16 pages, describes the company's rectangular, swiveling and vertical face type, magnetic chucks, showing various views of the chuck assembled and disassembled and in use on grinding machines. Sections are devoted to the company's improved demagnetizing switch and also to direct-current generator and demagnetizer. Specifications and dimensions of the various units included.

Gears.—Boston Gear Works, Norfolk Downs, Quincy, Mass. Catalog No. 40, 1922, 128 pages, $3\frac{1}{2} \times 6$ in. Lists the various types and sizes of gears carried in stock which includes spur gears in brass, iron and steel, worm,

mitre, bevel, and also spiral gears. Sprockets and steel chains are included as well as annular ball bearings and other material. Steel and iron internal gears for use with the company's new style pinion of less than 12 teeth, are also included.

Spur Gear Cutting Machines.—Newark Gear Cutting Machine Co., Newark, N. J. Catalog No. 3, 40 pages, 6×9 in. General information as to the operation and construction, the drive mechanism, cutter speeds and feeds, patented centralized control, indexing mechanism and other features of the machine are given at length in first part of the catalog. Other pages illustrate and give specifications of various sizes of machines, the company's No. 1 gear cutter grinding machine and the gear cutters in stock being also described and illustrated. A page is devoted to the company's gear hobbing machine for helical and herringbone gears. Many useful tables are given. The machines are classified as gear cutting machines, but are intended also for cutting sprockets, ratchet wheels, circular saw teeth and other work requiring automatic milling of this nature.

Sheet Mill Equipment.—Erie Foundry Co., Erie, Pa. Bulletin No. 90, illustrating and describing its improved line of sheet mill equipment, including galvanizing machines, leveling machines, cooling wheels, pickling equipment, acid and storage tanks and squaring shears.

Resistance Thermometry.—Brown Instrument Co., Philadelphia. Catalog which explains the theory of resistance thermometry and the various types of instruments which operate on the basis of electrical resistance, favoring accuracy and rapidity, especially for small ranges of temperature.

Steel Sash.—David Lupton's Sons Co., Philadelphia. Catalog 11 containing 191 pages and profusely illustrated with half-tones and line drawings, completely describes and shows in use, sash for all types of buildings, corrugated wire glass, shelving, bookstacks, partitions and general factory equipment. Details of construction of buildings equipped with steel sash with dimensions and illustrations of factories, power houses and other buildings so equipped are given, as well as detailed description of the sash itself, illustrated with sectional views and cross section drawings of the most suitable types of factory construction for the elimination of smoke and dust and clear ventilation.

Centrifugal Pump.—Bulletin No. 23 of the Goulds Mfg. Co., Seneca Falls, N. Y., describes the newest addition to its line of pumps, a steam turbine-driven centrifugal pump.

Broach Handbook.—The American Broach & Machine Co., Ann Arbor, Mich., has published a handbook for the purpose of placing information on broaching, broached fittings and standard broachings, their use and care, before engineers, superintendents, draftsmen, purchasing agents and others interested in broaching operations.

Power Press Attachments.—The V. & O. Press Co., Glendale, Long Island, N. Y. Bulletin No. 6-B, which covers automatic attachments for V. & O. presses.

Track Specialties.—The Track Specialties Co., 29 Broadway, New York. Booklet illustrating and describing its line of "Trasco" devices, which include practically everything for steam and electric railroad tracks.

Wiring Devices.—The Weber Electric Co., Henry D. Sears, general sales agent, 80 Boylston Street, Boston. Illustrated booklet of 104 pages covering a large line of electric wiring devices.

Trane Data.—The Trane Co., vapor heating equipment, pumps, etc., La Crosse, Wis. This seventh edition of bulletin 11 has 24 pages, $6 \text{ in.} \times 9 \text{ in.}$, printed in three colors and is filled with information, tables and blueprints relating to this application of low pressure steam heating systems. It illustrates also a number of heating specialties manufactured by the Trane Co.

Lighting Data.—Edison Lamp Works of the General Electric Co., Harrison, N. J. Additional bulletins of a series being published to cover eventually all phases of the lighting problem "Effect of Color on Walls and Ceilings on Resultant Illumination," "Fundamentals of Projection" and "The Lighting of Small Stores" are the titles. Out-of-date bulletins in the series are being replaced constantly by revised issues, and the researches of one kind and another have been thoroughly worked up, are accompanied by diagrams and illustrations and are full of information of interest to users of artificial light.

Boiler Feed Water Regulator.—Northern Equipment Co., Erie, Pa. A 20-page illustrated booklet, $8 \text{ in.} \times 11 \text{ in.}$, covering boiler feed control in general and describing the Copes system of control. The subject has been treated in a way to cover the subject of boiler feed water regulation completely and yet very briefly. Free use has been made of graphical methods of presentation: charts showing the effect of feed water regulation on water input, steam output, feed water temperature, etc., also other charts, photographs, etc., are used.

Current Metal Prices

On Small Lots, Delivered from Merchants' Stocks, New York City

The following quotations are made by New York City warehouses.

As there are many consumers whose requirements are not sufficiently heavy to warrant their placing orders with manufacturers for shipments in carload lots from mills, these prices are given for their convenience.

On a number of articles the base price only is given, it being impossible to name every size.

The wholesale prices at which large lots are sold by manufacturers for direct shipment from mills are given in the market reports appearing in a preceding part of *THE IRON AGE* under the general heading of "Iron and Steel Markets" and "Non-ferrous Metals."

Iron and Soft Steel Bars and Shapes		Per Lb.
Bars:		
Refined iron bars, base price	2.73c.	
Swedish bars, base price	7.00c.	
Soft steel bars, base price	2.73c.	
Hoops, base price	3.78c.	
Bands, base price	3.38c.	
Beams and channels, angles and tees		
3 in. x 1/4 in. and larger, base	2.83c.	
Channels, angles and tees under 3 in. x		
1/4 in., base	2.73c.	

Merchant Steel		Per Lb.
Tire, 1 1/2 x 1/2 in. and larger	2.73c.	
(Smooth finish, 1 to 2 1/2 x 1/4 in. and larger)	2.83c.	
Toe-calk, 1/2 x 3/8 in. and larger	3.50c.	
Cold-rolled strip, soft and quarter hard	.625c. to 7.25c.	
Open-hearth spring steel	3.50c. to 6c.	
Shafting and Screw Stock:		
Rounds	3.35c.	
Squares, flats and hex	3.85c.	
Standard cast steel, base price	12.00c.	
Extra cast steel	17.00c.	
Special cast steel	22.00c.	

Tank Plates—Steel		Per Lb.
1/4 in. and heavier		2.83c.

Sheets		Per Lb.
Blue Annealed		Per Lb.
No. 10		3.78c.
No. 12		3.83c.
No. 14		3.88c.
No. 16		3.98c.

Box Annealed—Black		Per Lb.
Soft Steel		Blued Stove
C. R., One Pass,		Pipe Sheet,
Per Lb.		Per Lb.
Nos. 18 to 20	4.00c. to 4.30c.	
Nos. 22 and 24	4.05c. to 4.35c.	4.60c.
No. 26	4.10c. to 4.40c.	4.65c.
No. 28	4.20c. to 4.50c.	4.75c.
No. 30	4.45c. to 4.75c.	
No. 28 and lighter, 36 in. wide, 10c. higher		

Galvanized		Per Lb.
No. 14	4.30c. to 4.60c.	
No. 16	4.45c. to 4.75c.	
Nos. 18 and 20	4.60c. to 4.90c.	
Nos. 22 and 24	4.75c. to 5.05c.	
No. 26	4.90c. to 5.20c.	
No. 27	5.05c. to 5.35c.	
No. 28	5.20c. to 5.50c.	
No. 30	5.70c. to 6.00c.	
No. 28 and lighter, 36 in. wide, 20c. higher		

Welded Pipe

Standard Steel		Wrought Iron			
Black	Galv.	Black	Galv.		
1/2 in. Butt..	—56	—40	3/4 in. Butt..	—30	—13
3/4 in. Butt..	—61	—47	1 1/2 in. Butt..	—32	—15
1-3 in. Butt..	—63	—49	2 in. Lap....	—27	—10
3 1/2-6 in. Lap..	—60	—46	2 1/2-6 in. Lap..	—30	—15
7-8 in. Lap..	—56	—34	7-12 in. Lap..	—23	—7
9-12 in. Lap..	—55	—33			

Steel Wire

BASE PRICE* ON NO. 9 GAGE AND COARSER		Per Lb.
Bright basic		3.50c. to 3.75c.
Annealed soft		3.50c. to 3.75c.
Galvanized annealed		4.25c. to 4.50c.
Coppered basic		4.00c. to 4.25c.
Tinned soft Bessemer		5.50c. to 5.75c.

*Regular extras for lighter gage.

Brass Sheet, Rod, Tube and Wire

BASE PRICE

High brass sheet	17 1/4 c. to 18 c.
High brass wire	18 1/4 c. to 18 1/2 c.
Brass rod	15 1/4 c. to 16 1/4 c.
Brass tube, brazed	24 1/4 c. to 25 c.
Brass tube, seamless	20 1/2 c. to 21 c.
Copper tube, seamless	22 3/4 c. to 24 c.

Copper Sheets

Sheet copper, hot rolled, 24 oz., 21 1/4 c. to 22 1/4 c. per lb. base.
Cold, rolled, 14 oz. and heavier, 2c. per lb. advance over hot rolled.

Tin Plates

Bright Tin	Grade "AAA"	Grade "A"	Coke—14-20	Primes	Western
	Charcoal	Charcoal	80 lb..	\$6.05	\$5.80
	14x20	14x20	90 lb..	6.15	5.90
			100 lb..	6.25	6.00
	IC..	\$10.00	\$8.50	IC..	6.40
	IX..	11.50	10.00	IX..	7.40
	IXX..	13.00	11.25	IXX..	8.40
	IXXX..	14.25	12.50	IXXX..	9.40
	IXXXX..	16.00	14.00	IXXXX..	10.40

Tin Plates

8-lb. coating, 14 x 20	
100 lb.	87.00
IC	7.25
IX	7.50
Fire door stock	9.00

Tin

Straits, pig	33 1/2 c.
Bar	40c. to 44c.

Copper

Lake ingot	15 1/4 c.
Electrolytic	15 c.
Casting	14 1/2 c.

Spelter and Sheet Zinc

Western spelter	7 1/4 c. to 7 1/2 c.
Sheet zinc, No. 9 base, casks	8 1/2 c. open 9 c.

Lead and Solder*

American pig lead	6 3/4 c. to 7 c.
Bar lead	8c. to 8 1/2 c.
Solder, 1/2 and 1/2 guaranteed	25c.
No. 1 solder	23 1/2 c.
Refined solder	20 1/2 c.

*Prices of solder indicated by private brand vary according to composition.

Babbitt Metal

Best grade, per lb.	75c.
Commercial grade, per lb.	55c.
Grade D, per lb.	35c.

Antimony

Asiatic	6 1/2 c. to 7 c.
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Aluminum

No. 1 aluminum (guaranteed over 99 per cent pure), in ingots for remelting, per lb.	25c. to 27c.
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Old Metals

Business was not active this week but values are generally unchanged. Dealers' buying prices are follows:

Copper, heavy crucible	11 1/2 c.
Copper, heavy wire	11 1/2 c.
Copper, light and bottoms	9 1/2 c.
Brass, heavy	6 1/2 c.
Brass, light	5 1/2 c.
Heavy machine composition	8 1/2 c.
No. 1 yellow brass turnings	6 1/2 c.
No. 1 red brass or composition turnings	7 1/2 c.
Lead, heavy	4 1/2 c.
Lead, tea	3 1/2 c.
Zinc	2 1/2 c.

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